CLINICAL PROFILE AND OUTCOME OF SNAKE BITE

IN CHILDREN

TIRUNELVELI MEDICAL COLLEGE HOSPITAL

DISSERTATION SUBMITTED FOR

M.D.DEGREE EXAMINATION

BRANCH VII – PAEDIATRICS

APRIL 2011

TIRUNELVELI MEDICAL COLLEGE

THE TAMILNADU DR. M.G.R. MEDICAL UNIVERSITY

CHENNAI, TAMILNADU

CERTIFICATE

This is to certify that this dissertation entitled **"CLINICAL PROFILE AND OUTCOME OF SNAKEBITE IN CHILDREN ADMITTED IN TIRUNELVELI MEDICAL COLLEGE HOSPITAL"** is a bonafide record of work done by **Dr. J. RAJESH** under my guidance and supervision in Tirunelveli Medical College Hospital during the period of his Post Graduate Study for M.D.(PAEDIATRIC MEDICINE) from 2008 – 2011.

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DECLARATION

I declare, that this dissertation entitled, **"CLINICAL PROFILE AND OUTCOME OF SNAKEBITE IN CHILDREN ADMITTED IN TIRUNELVELI MEDICAL COLLEGE HOSPITAL"** has been conducted by me at the Tirunelveli Medical College Hospital, Tirunelveli under the guidance and supervision of my unit chief **Professor Dr.T.Devikala, M.D., D.C.H.** It is submitted in part fulfillment of award of the degree of M.D.(Paediatric Medicine) for the April – 2011 examination to be held under The Tamilnadu Dr.M.G.R. Medical University, Chennai. This study has not been submitted previously by me for the award of any degree or diploma from any other university.

(Dr.J.RAJESH)

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INSTIUTIONAL ETHICAL COMMITTEE

CERTIFICATE OF APPROVAL

This is to certify that the INSTIUTIONAL EITHICAL COMMITTEE of TIRUNELVELI MEDICAL COLLEGE AND HOSPITAL, TIRUNELVELI -11 has unanimously approved the dissertation titled Clinical profile and outcome of snakebite in children. As this project is involved with human beings by Dr.J.Rajesh, MD., Paediatrics Student, TIRUNELVELI MEDICAL COLLEGE, TIRUNELVELI -11 in its meeting held on 09.10.2010.

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ACKNOWLEDGEMENT

I sincerely thank **Prof. Dr.N.Palaniappan, M.D.,** Dean of Tirunelveli Medical College and **Dr. Jimla Balachandran M.D.,** Medical Superintendent, Tirunelveli Medical College Hospital who has permitted me to conduct the study in this institution.

It is of immense pleasure to express my heart full gratitude to **Dr.T.Kathir Subramaniyam, M.D., D.C.H.,** Professor and Head of the department, Department of Paediatric Medicine for his expert guidance, careful supervision, constant encouragement and moral support throughout the period of this study.

I owe my profound gratitude to my teacher and Unit Chief **Dr.T.Devikala M.D.,D.C.H.,** for the boundless affection and kind encouragement given by her throught the study.

I shall always regard with great gratitude my Professor **Dr.P.Ravichandran M.D., D.C.H.,** for the inspiration and encouragement given to me.

I shall always regard with greatitude my Assistant professors **Dr.Mathivanan, M.D.,D.C.H., Dr.Krishnamoorthy, M.D.,D.C.H., Dr.Naresh, M.D.,D.C.H.,** for their able guidance and assistance in doing this work.

I render my special thanks to all the Assistant professors in Department of Paediatrics for guidance in doing this study.

I wish to thank all the patients for their cooperation and without whom the study could not have been conducted.

I thank God, the Almighty who has enabled me to walk through each and every obstacle and has helped me to complete the study in a successful manner.

I thank my wife, my daughter, my family who has enabled me to get regard of all the hurdles in this study and for their immense encouragement.

CONTENTS

INTRODUCTION

Snakes are fascinating part of nature. Their colour, movement and secret habits make them seem more mysterious than other animals. For people interested in wildlife, snakes are a wonderful introduction to the world of nature.

India has been known as a land of exotic snakes. Here, snakes have been worshipped as Gods for thousands of years. Even today, in Bathis Shirala, Maharashtra, during the harvest festival called 'Nag Panchmi', freshly caught cobras are worshipped with flowers, ghee and money. Most of us flee at the sight of a snake. However, a group of people have based their living on these primitive reptiles. They catch snakes for its skin and venom extraction.

Snake charmers carry snakes especially cobra, door to door for worship. At every house the snake's mouth is forced open and some milk is poured down in its throat though milk is not snake food. It is also believed that snakes bite people who harmed them in their previous birth. When snakes are killed, people offer special prayers and bury them. People also believe that snakes take revenge against those who harmed them. In view of their strong beliefs and many associated myths, people resort to magical and religious treatment for snake bite thus causing delay in seeking proper treatment. As a result, valuable time is lost in some of the deserving cases.

MAGNITUDE OF THE PROBLEM:

Recently global burden of snake bite was assessed using available published data and modelling technique. From that it is estimated that 4,21,000 envenomations and 20,000 deaths occur annually. These figures may be as high as 18,41,000 envenomations and 94,000 deaths.

Snake-bite is an important and serious medical emergency in India. India alone contributes to 81,000 envenomations and 11,000 deaths annually.Case fatality rate is 2-10%.[6]

Based on the above statistics, it appears that every 10 seconds one individual is envenomed and one among four dies due to snake bite. Many deaths occur before the victim reaches the hospital.

Actually up-to-date national data on the morbidity and mortality due to snakebite is not available. Moreover there is no national snake bite registry in India. So the available statistics is incomplete and not systematically collected.

In 1972, Dr. Sawai and Dr. Homma of the Japan Snake Institute studied snakebite in about 10 hospitals in India. They reported that about 10% of snakebite deaths are among the victims who come to the hospital and about 90% die outside, having gone for other remedies like *mantra*, magic, and so on.

EPIDEMIOLOGY OF SNAKEBITE:

Snakebite is observed all over the country with a rural / urban ratio of 9:1. They are more common during monsoon and post monsoon seasons. Snakebites are seen often in rural areas among agricultural workers and among those going to the forest. Many of the susceptible populations are poor living below poverty line, living in rural areas with less access to health care.

The male / female ratio among the victims is approximately 3:2. Most of the bites (90 to 95%) are noticed on the extremities (limbs). They are accidental and inflicted on lower limbs of high risk population such as children while playing or working in field.

The hospital stay varies from 2 to 30 days, with the median being 4 days. Seasonal peaks in incidence are associated with onset of rainy season, flooding & rice harvesting season and occasionally during construction of new buildings. The in-hospital mortality varies from 5 to 10%, and the causes are acute renal failure, respiratory failure, sepsis, bleeding and others.

TAXONOMY & IDENTIFICATION OF SNAKES:

"NOT ALL SNAKES ARE POISONOUS"

There are more than 3000 species of snakes worldwide of which only 300 are poisonous. About 236 species of snakes are found in India, ranging in size from 100mm long worm snakes to 6m long pythons.[1] Of the 236 species about 50 are reported to be poisonous.[2]

Among the non-venomous snakes only the giant constrictors are potentially dangerous to man – these include the South African and Asian pythons and the South American anaconda [4].

Classification:

Poisonous snakes prevalent in India belong to four families

1. **Elapidae** – Cobras & Krait
2. **Viperidae** (true vipers) – Russell's viper & Saw scaled viper.
3. **Colubridae** (pit vipers) – Green pit viper.
4. **Hydrophidae** (or) sea snakes.[5]

In India, although 50 species belonging to these families are venomous, most are no threat to man. The only venomous snakes to be wary of are the **"BIG FOUR"**

COBRA, KRAIT, RUSSELL VIPER, SAW SCALED VIPER.[2]

The concept of the "Big 4" snakes has failed to include all currently known snakes of medical significance in India. This has a negative effects on clinical management of snakebite and the development of effective snake anti venoms.

In 1981, the W.H.O. developed the definition of snakes of medical importance. This model is more accurate and useful than

definitions such as the 'Big 4' that are inaccurate and misleading to doctors and more importantly to ASV manufactures.

CATEGORISATION OF SNAKES (W.H.O. 1981) :

CLASS	DETAILS	NAME OF THE SNAKE
I	Commonly cause death or serious disability	Russells viper / Cobra / Saw scaled viper
II	Uncommonly cause bites but are recorded to cause serious effects(death or local necrosis)	Mountain pit viper/ Krait / Hump-nosed pit viper /King cobra
III	Commonly cause bites but serious effects are very uncommon.	Green snake / Water snakes

COBRAS:

Two species of cobras are found in India, common cobra (Nalla or Nagu Pambu) and king cobra (Raja Nagam or Karu Nagam). Cobras vary in colour from black or dark brown to yellow white. The head is indistinct from the neck and the ribs in this region are movable and expand to form the hood. This hood on its dorsal aspect resembles a spectacle showing a connected pair of rings. Cobras are often confused with Indian rat snakes (sara pambu) .

KRAITS:

Two species of Kraits are commonly found in India- Common Krait (kattu viriyan or karuvelan pambu) & Banded krait (pattai kattu viriyan). Common krait is steel blue or black with white bars on the back. Banded

krait is larger and is jet black in colour with yellow bars. Kraits are usually found in pairs.

RUSSELL'S VIPER: (KANNADI VIRIYAN) :

This is a larger snake measuring 6 feet and is stout, lazy looking and makes aloud hissing sound by expelling air through its large nostrils. It is brownish yellow with dark round spots on the dorsum edged with white and black colour.

SAW SCALED VIPER: (SURUTAI PAMBU) :

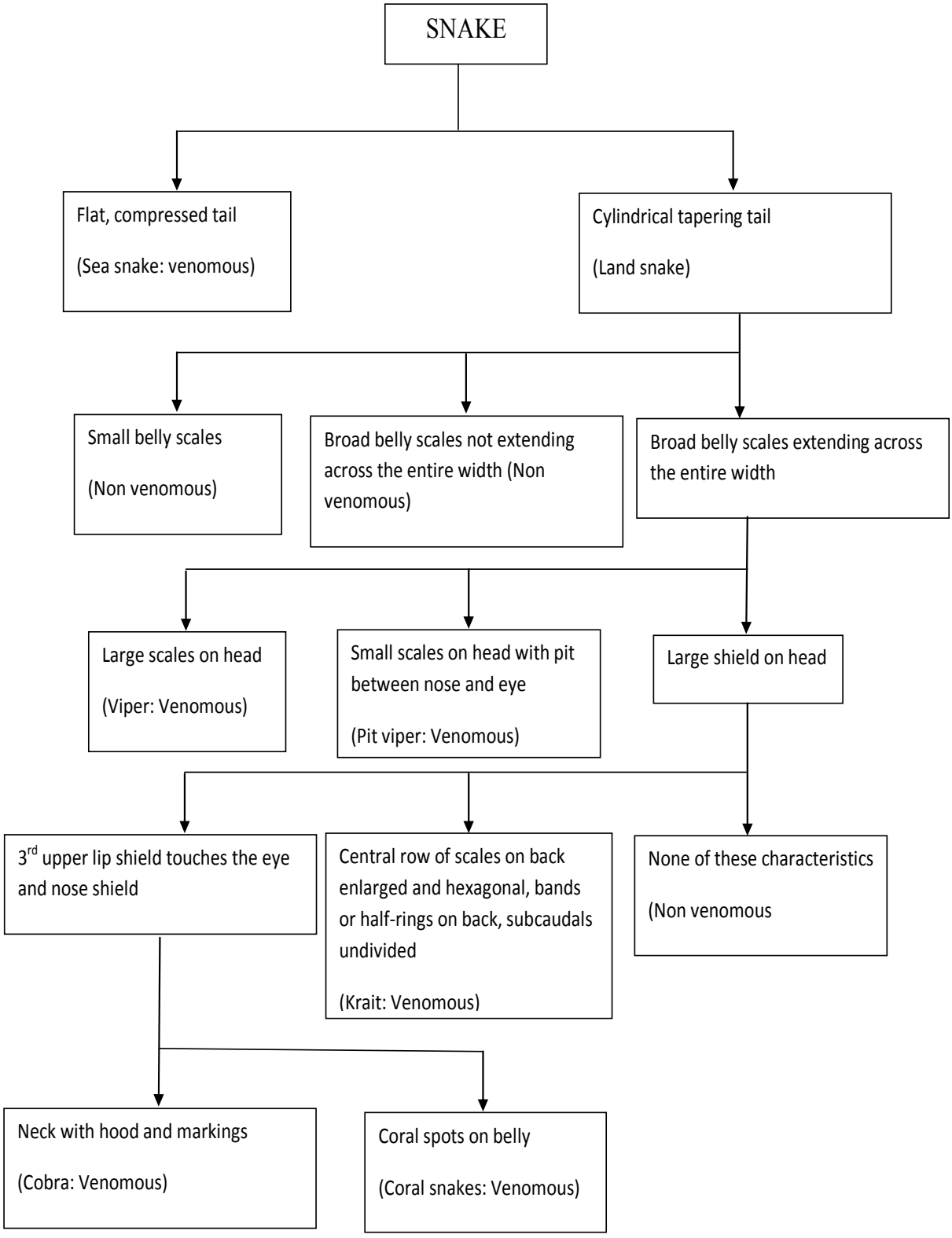
A small snake (30cm long) with brown or greyish dorsum showing zig zag pattern. It has a distinct cross or lance mark on the head. The ventral scales are rough. They produce a rasping sound by rubbing their coils together. This snake is often confused with a non poisonous snake " cat snake" (ponnai or ollai Pambu) which has a thin long tail,

prominent eyes and a clear mark on the head.

IDENTIFICATION OF SNAKES

There is no simple rule for identifying a dangerous venomous snake. Some harmless snakes have evolved to look almost identical to venomous ones. However, some of the most notorious venomous snakes can be recognized by their size, shape, color, pattern of markings, their behavior and the sound they make when they feel threatened. For example, the defensive behavior of the cobras is well known, they rear up, spread a hood, hiss and make repeated strikes towards the aggressor. Coloring can vary a lot. However, some patterns, like the large white, dark rimmed spots of the Russell's viper, or the alternating black and yellow bands of the banded krait are distinctive. The blowing hiss of the Russell's viper and the grating rasp of the saw-scaled viper are warning and identifying sounds.

Generally speaking non poisonous snakes have blunt tails, solid teeth, no fangs and semicircular ventral scales. Ventral scales do not completely cover the belly except in colubridae (rat snakes). Most often a killed snake is brought by the patient and physician has to identify whether they are poisonous or not.


SNAKE
Flat, compressed tail
(Sea snake: venomous)
Cylindrical tapering tail
(Land snake)
Small belly scales
(Non venomous)
Broad belly scales not extending across the entire width (Non venomous)
Broad belly scales extending across the entire width
Large scales on head
(Viper: Venomous)
Small scales on head with pit between nose and eye
(Pit viper: Venomous)
Large shield on head
3rd upper lip shield touches the eye and nose shield
Central row of scales on back enlarged and hexagonal, bands or half-rings on back, subcaudals undivided
(Krait: Venomous)
None of these characteristics
(Non venomous
Neck with hood and markings
(Cobra: Venomous)
Coral spots on belly
(Coral snakes: Venomous)

FANGS :

As previously believed, bite marks are not useful indicators of poisoning. This is because many venomous species possess more than 1 set of fangs and non venomous species can leave two puncture marks from enlarged teeth, which can give fang-like appearance.

GREEN MAMBA WITH FANGS

VENOM APPARATUS AND COMPOSITION:

In certain poisonous snakes the paired salivary gland has assumed a very significant function – the venom apparatus[7].They secrete venom, a powerful multipurpose enzyme fluid through the channelled or grooved teeth, the fangs[7].Venom can be injected from the bottom of the fang (viper) or by an opening at the anterior aspect of the fang, a few millimetres above the tip. The performance of the venom apparatus varies with different species[4].

The Palestine vipers in catching their prey inject lethal doses of venom to ten or more humans in rapid succession, the second or third victims were sometimes more envenomed than the first[4]. However Russell vipers appear

to inject most of their available venom at first strike[4]. 50% of Malayan pit viper bite showed little or no envenoming. This suggests that some snakes might be capable of biting defensively without injecting venom.

Snake venom is a complex fluid with powerful ingredients that acts to immobilize its prey. Venom is a faint, transparent, yellowish, slightly viscous and acidic fluid. It is extremely heterogenous containing about 15 enzymes and 10 non enzymatic proteins and peptides and at least a dozen of other substances[7].

Deoras in 1965 reported the lethal dose of venoms of common Indian poisonous snakes to: Cobra – 0.12g , Krait- 0.06g, Russell viper-0.15g,Echis carinatus –0.08g .

Variations in venom composition from species to species explains the varied clinical presentation of snake bite. There is a considerable variation in the relative proportions of different venom constitutions within a single species throughout the geographical distribution, at different seasons of the year, and as a result of aging.[4] Hyaluronidase is present in almost all snake venoms. It hydrolyzes the hyaluronic acid in interstitial spaces of the cells and connective tissue allowing further penetration of venom into surrounding tissues.[7]

Proteases in viper venom activate the mammalian clottingcascade by activation of factor Ix or X. Ecarin ,a zinc metalloprotein activates prothrombin.[4]

ENZYMATIC EFFECTS OF SNAKE VENOM	
ENZYME	**EFFECTS**
Arginine ester hydrolase	Bradikinin release , interference with clotting
Proteolytic Enzymes	Tissue distruction, Bleeding
Collagenase	Digestion of collagen
Hyaluranidase A	Reduction of collagen viscosity.
Phospholipidase A	Un coupling of oxidative phosphorylation
Phospholipidase B	Hydrolysis of lyso phosphorylation
Phospho diesterase	Inhibition of DNA , RNA , arabinose derivative
Acetyl cholinesterase	Catalysis of hydrolysis of Ach.
5'Nucleotidase	Specific hydrolysis of monoesterase which links with 5'position of DNA,RNA.
Thrombin like Enzyme	Depression of fibrinogen levels

NON- ENZYMATIC COMPONENTS IN SNAKE VENOM	
COMPONENT	**EFFECTS**
NEUROTOXIN: Cobra toxin, rabutoxin,α bungarotoxin	Poly synaptic non-depolarising neuro muscular nicotinic Ach receptors.To some extent cardio toxic, hemotoxic and anti coagulant
CERULOTOXIN: (Krait)β bungarotoxin	Similar post synaptic block but without binding to receptors. Pre synaptic motor nerve end blockade
HAEMORRHAGINS : (HR-1, HR-2) (vipiridae,crotolidae)	Direct distruption of vessel endothelium. Pro coagulant effect: Factor IX activation by cleavage of peptide bonds.Factor X activation by calcium binding to gamma glutamic residues in X with rapid changeXa. Direct pro thrombin activation by cleavage of peptide bonds by venom. Anti coagulant effects: By inhibition of platelet, clotting factors and direct fibrinolysis.
CARDIOTOXIN:	Neuro muscular blockage, hemolysis, cytotoxicity, cardiac arrest.

INVESTIGATIONS:

Investigations are used for monitoring the patient and determining the type of envenomation.

20 Minutes Whole Blood Clotting Time(WBCT) :-

Advantages	Requirements	Procedure
• The most reliable test of coagulation. • Can be carried out, at the bedside. • Does not require specialised training	• Dry glass test tube (clean and new) • 2ml disposable syringe • Cotton • Antiseptic solution • Clean gloves (one pair) • (The test tube must not have been washed with detergent, as this will inhibit the contact element of the clotting mechanism)	• Wash hands with soap and water. • Wear the gloves • Collect 2ml blood from the peripheral vein of the unaffected limb • Remove the needle and pour the blood along the walls of the test tube • Keep the test tube untouched and unshaken in a safe place near the patient's bedside at ambient temperature for 20 minutes • Note the time • After 20 minutes the test tube is gently tilted and if the blood is still liquid then the patient has incoagulable blood.

If the blood is not coagulable after 20 minutes, it confirms that the biting species is viper. Cobras or Kraits do not cause anti-hemostatic symptoms.

If the 20WBCT is normal in a suspected case of poisonous snakebites, the test should be carried out every 30 minutes from admission for three hours and then hourly after that.

If incoagulable blood is discovered, the 6 hourly cycle will then be adopted to test for the requirement of repeat doses of ASV. This is due to the inability of the liver to replace clotting factors under 6 hrs.

OTHERS :

- Complete blood count - anemia, thrombocytopenia
- Peripheral smear - hemolysis and DIC
- Coagulation profile - increased bleeding time, clotting time and prothrombin time
- Renal function tests
- Electrolytes - hyperkalemia may be present
- Urinalysis - RBC's, RBC cast or hemoglobin
- ECG - usually nonspecific and include bradycardia, AV block with ST segment elevation or depression, features of hyperkalemia.

MANAGEMENT:

FIRST AID :-

As 70 percent of all snakebites are from non venomous species and only 50% of bites by venomous species actually envenomate the patient, reassure the patient to prevent exertion and anxiety.

DO'S :

THE "R.I.G.H.T" WAY

R. = Reassure the patient.

(70% of all snakebites are from non-venomous species. Only 50% of bites by venomous species actually envenomate the patient)

I = Immobilise the patient

in the same way as a fractured limb. Use bandages or cloth to hold the splints, not to block the blood supply or apply pressure.

G. H. = Get to Hospital Immediately

(Traditional remedies have NO PROVEN benefit in treating snakebite).

T= Tell the doctor of any systemic symptoms

such as ptosis that manifest on the way to hospital.

DONT'S :

Do not **wash** the wound immediately as it increases the flow of venom into the system by lymphatic stimulation.

Do not use **household remedies** like application of turmeric powder / chalk powder at the site of bite.

Do not **cut the site of bite or apply suction** as it increases the risk of bleeding to death as well as increases the risk of infection. Venom is not cleared or removed by this method.

Do not use **Snake stone.** It is applied to the site of bite saying that it will absorb the venom and falls once the venom is absorbed. This contributes to delay in seeking appropriate health care.

Do not use **Tourniquets.** Tight tourniquets made of rope, string and cloth, have been followed traditionally to stop venom fl ow into the body following snakebite. The problems noticed with tourniquets are :-

• Risk of ischemia ,necrosis and loss of the limb

• Risk of massive neurotoxic blockade

• Risk of embolism if used in viper bites.

• Release of tourniquet may lead to hypotension.

• Gives patient a sense of false security, which encourages them to delay their journey to hospital.

Do not apply **hot or ice applicants** to the site of bite as it may aggravate the necrotic effect of venom.

Do not apply **ASV on site of bite** as it is of no benefit.

CRITERIA FOR ANTI SNAKE VENOM ADMINISTRATION:-

- Severe local symptoms – swelling rapidly crossing a joint or involving half of the bitten limb in the absence of tourniquet.
- Increased 20 minutes whole blood clotting time or spontaneous bleeding.
- Neurological impairment such as ptosis.

CONTRAINDICATIONS:

No definite contraindication as ASV is the only therapy

TYPES OF ANTI SNAKE VENOM:

Mono – specific forms are more effective and less likely to cause reactions than poly specific antivenom. In most developing countries only a single poly specific antivenom is available[11]. In India ASV is produced by Haffkine Institute, Bombay, and Central Research Institute, Kasauli. It is produced by hyperimmunizing horses against the common four poisonous snake (Cobra, Krait, Russell's and Saw scaled viper).[1]

DOSAGE OF ASV:-

The initial ASV dose is a subject of debate. As russell's viper on an average injects about 63 mg of venom in the first bite to both adults and children, logic is to administer ASV to neutralize this amount of venom. One vial of ASV neutralizes 6 mg of russell's viper venom. So a total of 8-10 vials may be required for the initial dose. The range of venom injected varies from 5 – 147 mg. so a maximum of 25 vials may be required.

There is no evidence to suggest children should receive either more ASV because of body mass or less in order to avoid adverse reactions. ASV is to be administered over a period of 1 hr.

ADVERSE EFFECTS :-

Adverse effects to antisnake venom may be due to anaphylaxis or pyrogenic reactions. If handled early and with the primary drug of choice,

these reactions are easily surmountable. Early intervention against these kind of reactions has been shown to have more positive outcomes.

The reactions are urtricaria, itching, fever, chills, nausea, vomiting, diarrhea, abdominal cramps, tachycardia, hypotension, bronchospasm and angioedema.

MANAGEMENT:-

On the appearance of any one of the reactions, ASV should be discontinued. Adrenaline 0.01 mg/kg is the drug of choice. It should be given intramuscularly as absorption is fast (usually within 8 mins). Adrenaline can be repeated every 10 mins to a maximum of three doses. For longer protection Hydrocortisone 2 mg/kg and antihistaminics 0.2 mg/kg should be administered. After the reactions have subsided ASV should be restarted slowly.

ASV test dose is abandoned since they have no predictable value in anaphylactoid or late serum reactions and they also pre-sensitize the patient to proteins.

REPEAT DOSES OF ASV :-

If the 20 mins WBCT after 6 hrs is prolonged or the cellulitis is increasing then ASV should be repeated. In case of neurotoxic bites once the initial 10 vials and neostigmine 0.05 mg/kg has been given monitor the patient. If condition does not improve or it worsens within 1-2 hrs then a second and final dose should be given. If there is no improvement even after

the second dose, then further ASV is of no use and the patient is put on ventilator.

SUPPORTIVE MANAGEMENT:

- Fluid management and ionotropes
- Analgesics and sedatives
- Broad spectrum antibiotics with anaerobic coverage
- Blood component transfusion
- Local wound management
- Ventilatory support in case of Respiratory failure
- Dialysis if acute renal failure is present
- Fasciotomy if compartment syndrome is present

AIM OF THE STUDY

To assess the clinical profile of snake bite with outcome parameters (morbidity & mortality) in children admitted in Tirunelveli Medical College Hospital.

REVIEW OF LITERATURE

Adhisivam et al did a retrospective study about the clinical profile of snake bite envenomation in children in JIPMER. The study showed that 42 % of the bites were hemotoxic and 8 % were neurotoxic. No of deaths due to the snake bite was 9 (18%) and all were due to hemotoxic bites. Complications like DIC (10%) and acute renal failure (18%) were present. 4 of them required ventilator support (all were neurotoxic bites). Local cellulitis was present in 66 % of the patients. Average ASV required was 100 ml (10 vials). Anaphylaxis to ASV was seen in 12 % of cases.

Sharma N et al did a retrospective study on clinical profile of snake bite in postgraduate institute of medical science and research. Of a total of 142 cases of snakebite there were 86 elapid bites presenting with neuroparalytic symptoms and 52 viper bites having haemostatic abnormalities. Urban to rural ratio was 1:4.7 and male to female ratio was 4.25:1. Median time to arrival at hospital after the bite was 9 hours and mean duration of hospital stay was 8 days. Twenty seven cases had acute renal failure and 75% of all elapid bites required assisted ventilation. Seventeen of 119 patients who received antivenom had an adverse event. Overall mortality rate was 3.5%.

Suchithra N et al did a retrospective study to determine the clinical characteristics, factors involved in complications and the outcomes in

relation to timing of polyvalent snake antivenom (SAV) administration in 586 patients with snakebite envenoming. The species of snake was identified in 34.5% of the venomous bites. 93.5% had signs of local envenoming.The mortality rate was 3%. Capillary leak syndrome, respiratory paralysis and intracerebral bleeding were the risk factors for mortality. 39.5% had complications, with acute renal failure being the most common (25.5%). Those who received SAV late had a higher risk of developing acute renal failure. Early administration of SAV reduces the risk of complications.

Bawaskar et al did a retrospective study in Bawaskar Hospital and Research Centre to determine the profile of snakebite envenomation in western Maharashtra. Out of the 91 patients 45 (49.5%) patients had snakebite without envenoming. 26 (28.6%) patients were paralyzed. 29 (31.9%) patients brought the snakes responsible for the bites (20 kraits, 9 Echis carinatus). 27 patients had local fang marks without local and systemic manifestations. Ten (11.0%) patients died. Early administration of anti-snake venom (ASV), endotracheal intubation and timely intervention with manual ventilation by Ambu bag and anticholinesterase treatment for Elapidae (krait and cobra) envenoming are crucial for saving lives.

Pande DP et al did a study in Punde hospital Mukhed, to determine the pattern of snake-bites and their management in a rural area of India over a 10-year period. A total of 633 patients with snake-bite admitted to the

Rural Community Centre and Punde Hospital were analysed retrospectively. Ready availability and appropriate use of antisnake venom, close monitoring of patients, institution of ventilatory support and early referral to a larger hospital when required help in reducing the mortality. Most patients with snake-bites can be successfully managed even in small rural hospitals with limited facilities.

Bhardwaj A et al did a study in Central Research Institute, Himachal Pradesh to determine the risk factors exposing the population to snake bite and the common types of snakes causing them.84% of the bites were on the hands and feet (up to the ankle). Snake bites while sleeping were at uncommon sites. Non-poisonous snakes were the most common (90.5%). Kraits caused 60% of bites with envenomation.

Bawaskar et al did a study in Bawaskar Hospital and Research Centre, Mahad Raigad, Maharashtra to determine the envenomation by the common krait (Bungarus caeruleus) and Asian cobra (Naja naja), their clinical manifestations and management in a rural setting.He concluded that early administration of antivenom prevents respiratory paralysis after elapid snake bite. Patients with evidence of respiratory insufficiency after neurotoxic venom poisoning require rapid intubation and artificial ventilation.

Lal P et al did a retrospective study to find out the socio-demographic profile of snakebite cases admitted in JIPMER About 68 percent of the cases were males. About 40 percent of cases were observed from the period of September to November which coincided with maximum rainfall. About 85 percent of cases either got relieved or cured and 13.5 percent experienced mortality.

K Narvencar et al did a study in Department of Medicine, Goa Medical College, Bambolim, Goa to find out the relationship between the time of anti-snake venom (ASV) administration due to late arrival of patient at hospital and subsequent development of complications.Incidence of complications was directly proportional to the duration of venom in the blood prior to neutralization by ASV due to late arrival of patient at hospital. The early institution of ASV is beneficial in preventing complications however severe is the systemic envenomation.

Sawai et al showed that 68% of snake bites occurred in the evening and night; 32% in the morning and afternoon. 72% of bites were on the lower limbs; 25% on the hand and arm; and 3% were on the trunk.71% of the victims are found in the age group of 11-50 yrs and 75% of the victims were male.

Ahuja et al in his study showed that 81.5% of victims were field workers. 75% bite occurred outdoors; 88.6% of victims were from rural area.

Incidence of snake bite in India shows a seasonal variation. In North India 70-80% of bites are seen in the warmer months may to October.

K. Sam and M. Khan et al.,showed that snake bite severity scores were directly proportional to the time elapsed between snake bite instance and hospitalisation time. Those patients who were admitted late had higher number of complications like renal failure (52%), breathing difficulty (42%), cellulitis (40%), abnormal PT and APTT in 42% and 39% of cases respectively. Mortality rate was the highest (16%) and higher morbidity and squeal were observed among patients (18%) who were admitted after 24 hours of envenomation. Majority (64%) of those admitted after 13-18 hours seemed to have more complications.

MATERIALS AND METHODOLOGY

STUDY CENTRE:

Tirunelveli Medical college Hospital, Tirunelveli.

STUDY PERIOD:

The study period is from November 2008 to August 2010.

STUDY DESIGN:

Prospective study.

INCLUSION CRITERIA:

- All children admitted with history of snake bite
- Any child with history of unknown bite with either
  - Cellulitis (involving more than 1/3rd of limb or crossing a joint) or
  - Prolonged 20 mins whole blood clotting time or
  - Neurological signs (ptosis) of envenomation were included into the study.

EXCLUSION CRITERIA:

- All other bite Including scorpion sting and insect bite

METHODOLOGY:

After obtaining approval by the ethics committee and informed consent, all children <12 yrs who were admitted with snake bite were enrolled in the study. A total of 126 cases who met the above criteria were taken into the study. The patient's age, sex, site of bite, duration of arrival to the hospital, clinical manifestations, a detailed examination and investigations relevant were taken. The no of vials of ASV, their complications were taken into account. The complications were managed with intramuscular adrenaline, steroids and antihistaminics. All the children were followed till discharge or death. The outcome was recorded as alive or death.

STATISTICAL TOOLS:

The information collected regarding all the selected cases were recorded in a Master Chart. Data analysis was done with the help of computer using **Epidemiological Information Package (EPI 2008)** developed by Center for Disease Control and Prevention (CDC), Atlanta for W.H.O.

Using this software, frequencies, percentages, means, standard deviations, chi square and 'p' values were calculated. Kruskul Wallis chi-square test was used to test the significance of difference between quantitative variables and Yate's test for qualitative variables. A 'p' value less than 0.05 is taken to denote significant relationship.

TABLE 1 : AGE DISTRIBUTION :

AGE IN YEARS	CASES	
	NO	%
Up to 4 years	15	11.9
5 – 8 years	42	33.3
9 – 12 years	69	54.8
Total	126	100
Mean	8.14	
S.D.	2.646	

Of the 126 children evaluated, most of the children were under the age group of 9 – 12 years (54.8%). The second most commonest group is 5 – 8 years (33.3%). The mean age was 8.14 years.

TABLE 2: SEX DISTRIBUTION

SEX	CASES	
	NO	%
Males	89	70.6
Females	37	29.4
Total	126	100

Out of 126 children, 89 were males constituting to about 70.6% and the remaining 37 were females (ie) around 29.4%.

TABLE 3: AREA OF LIVING

LOCATION	CASES	
	NO	%
Urban	41	32.5
Rural	85	67.5
Total	126	100

In this study children from Rural area had more common occurrence of snake bite than Urban area ,contributing 67.5% of the total patients.

TABLE 4: DURATION BETWEEN SNAKE BITE & NEEDLE TIME

TIME INTERVAL (IN HOURS)	CASES	
	NO	%
< 4	67	53.2
4 – 8	39	31.0
9 – 12	12	9.5
> 12	8	6.3
Total	126	100
Mean	4.86	
SD	3.915	

Out of the 126 children, 67 were brought to hospital within 4 Hours of bite contributing to 53.2%. The second commonest group came within 8 Hours of bite (ie) around 31%.

TABLE 5: SITE OF BITE

SITE OF BITE	CASES	
	NO	%
Upper limb	29	23.1
Lower limb	95	75.4
Others	2	1.5
Total	126	100

Among the 126 children, involvement of the lower limb was more common than the upper limb, 75.4% and 23.1% respectively. The least common being abdomen.

TABLE 6: PRE HOSPITAL TREATMENT

TREATMENT	CASES	
	NO	%
Injection	34	26.9
Incision at bite site	8	6.3
ASV	20	15.8
Incision + ASV	2	1.5
Not given	62	49.5
Total	126	100

Out of the 126 children, 64 had undergone some type of pre hospital treatment. Among them only 20 had received ASV constituting to about 15.8%. 62 children were admitted to the hospital directly without any treatment.

TABLE 7: CELLULITIS

CELLULITIS	CASES	
	NO	%
Present	90	71.4
Absent	36	28.6
Total	126	100

Among the 126 children, 71.4% children had cellulitis either during admission or during the course of hospital stay.

TABLE 8: FANG MARK

FANG MARK	CASES	
	NO	%
Present	**91**	**72.2**
Absent	**35**	**27.8**
Total	**126**	**100**

Of the total number of snake bite children only 91 children had fang mark, constituting to 72.1%

TABLE 9: TYPE OF BITE

TYPE OF BITE		CASES	
		NO	%
Poisonous (102)	Hemotoxic	65	51.6
	Neurotoxic	15	11.9
	Only cellulitis	22	17.5
Non poisonous (24)		24	19.0
TOTAL		126	100

Of the total number of cases 102 patients were bitten by poisonous snakes accounting to 81% , the most common being hemotoxic .

TABLE 10: NO OF VIALS OF ASV

ASV		CASES	
		NO	%
Given (102)	≤10 Vials	72	57.2
	>10 Vials	30	23.8
Not given		24	19.0
Total		126	100

Among the 126 children, 102 required ASV. Of which 30 children needed more than 10 vials, constituting to about 23.8%. Remaining 57.2% needed only less than 10 vials.

TABLE 11 :- ANAPHYLAXIS TO ASV

COMPLICATION TO ASV	CASES	
	NO	%
Present	39	38.2
Absent	63	61.8
Total	102	100

Out of the 102 children who received ASV, 39 developed anaphylactic reaction to ASV, accounting to 38.2%. Remaining 61.8% did not had complications pertaining to ASV.

TABLE 12: COMPLICATIONS DUE TO SNAKEBITE

COMPLICATIONS		CASES	
		NO	%
PRESENT (23)	Renal failure	8	6.3
	Encephalopathy	1	0.8
	Respiratory failure	7	5.6
	Resp.failure & Encephalopathy	2	1.6
	Gangrene	3	2.4
	DIC	1	0.8
	DIC & Encephalopathy	1	0.8
ABSENT		103	81.7
TOTAL		126	100

Out of the126 Children, 23 had complications constituting to about 18.3%. Among them renal and respiratory failures were more common. Remaining 103 children were devoid of complication.

TABLE 13: OTHER MODALITIES OF TREATMENT

VARIABLES	CASES	
	NO	%
Blood component transfusion	11	8.7
Fasciotomy	6	4.76
Peritoneal Dialysis	2	1.58
Ventilator support	9	7.14

Around 28 children required other modalities of treatment, blood transfusion and Ventilatory support being the commonest. Peritoneal Dialysis was warranted in 2 patients.

TABLE 14: DURATION OF HOSPITAL STAY

DURATION (IN DAYS)	CASES	
	NO	%
≤7 days	81	64.3
>7 days	45	35.7
Total	126	100
Mean	6.67	
SD	3.712	

The mean duration of hospital stay was 6.67 days. Children who stayed less than 7 days were 64.3% forming the major proportion.

TABLE 15: OUTCOME

OUTCOME	CASES	
	NO	%
Alive	123	97.6
Death	3	2.4
Total	126	100

Out of 126 children, 123 were alive and 3 of them died. Mortality of snake bite admitted in our hospital was 2.4%.

TABLE 16: AGE AND OUTCOME:

AGE GROUP	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Up to 4 years(15)	14	11.4	1	33.3
5 – 8 yrs(42)	40	32.5	2	66.7
9 – 12 yrs(69)	69	56.1	-	-
Total	123	100	3	100
Chi^{2-} 3.893				
df-2				
p-0.143 (Not significant)				

In this study age distribution is not influencing the outcome per se. Even though death is common younger age group.

TABLE 17: SEX AND OUTCOME

SEX	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Males (89)	88	71.5	1	33.3
Females (37)	35	28.5	2	66.7
Total (126)	123	100	3	100
Chi^2-2.062				
df-1				
p-0.151 (Not significant)				

In this study sex of the patient did not had influence upon the outcome.

TABLE 18: DURATION BETWEEN BITE AND NEEDLE TIME WITH OUTCOME

DURATION BETWEEN BITE AND NEEDLE TIME	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Less than 4 hours (67)	67	54.5	-	-
4 – 8 hrs (39)	37	30.1	2	66.7
8 – 12 hrs (12)	11	8.9	1	33.3
More than 12 hours (8)	8	6.5	-	-
Total (126)	123	100	3	100
Chi^2 - 4.925				
df – 3				
p - 0.177 (not significant)				

Duration between bite and Needle time was not statistically significant possibly due to less numbers in death. Death was common among patients who had ASV after 4 Hours of snake bite.

TABLE 19 : AREA OF LIVING & OUTCOME

LIVING	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Rural (85)	82	66.7	3	100
Urban (41)	41	33.3	-	-
Total (126)	123	100	3	100
Chi^2-1.482				
df-1				
p-0.223 (Not significant)				

Area of living was not statistically influencing the outcome. Still all the 3 death were in the Rural population.

TABLE 20: SITE OF BITE & OUTCOME

SITE OF BITE	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Upper Limb (29)	28	23.8	1	33.3
Lower Limb (95)	93	75.6	2	66.7
Others (2)	2	1.6	-	-
Total (126)	123	100	3	100
Chi^2-0.222				
df-2				
p-0.895 (Not significant)				

In this study site of Snake bite had no influence upon the mortality.

TABLE 21:- FANGMARK AND OUTCOME

FANG MARK	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Present(91)	88	71.5	3	100
Absent (35)	35	28.5	-	-
Total (126)	123	100	3	100
Chi^2-1.182				
df-1				
p-0.277 (Not significant)				

Fang mark is not statistically affecting the final outcome. But all the 3 deaths were in the Fang mark positive group.

TABLE 22 :- CELLULITIS AND OUTCOME

CELLULITIS	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Present(90)	87	70.7	3	100
Absent (36)	36	29.3	0	-
Total (126)	123	100	3	100
Chi^2-1.229				
df-1				
p-0.268(Not significant)				

Cellulitis is not statistically affecting the final outcome.

TABLE 23 :- PRE HOSPITAL TREATMENT AND OUTCOME

PRE HOSPITAL TREATMENT	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
ASV (20)	20	32.8	0	-
Incision at bite site (8)	7	11.5	1	33.3
Incision + ASV (2)	2	3.3	-	-
Injections (34)	32	52.4	2	66.7
Total (64)	123	100	3	100
Chi^2 -2.284				
df-3				
P – 0.516 (Not significant)				

In this study pre hospital treatment had no influence upon the outcome statistically. Death occurred in children who received treatment other than ASV.

TABLE 24: TYPE OF BITE & OUTCOME

TYPE OF BITE	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Hemotoxic (65)	63	51.2	2	66.7
Neurotoxic (15)	14	11.4	1	33.3
Only cellulitis(22)	22	17.9	-	-
Non poisonous(24)	24	19.5	-	-
Total	123	100	3	100
Chi^2-2.443				
df-3				
p-0.486 (Not significant)				

Type of bite had no correlation with the mortality.

TABLE 25: NUMBER OF ASV & OUTCOME:

NUMBER OF ASV	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Less than 10 vials (72)	72	72.7	0	-
More than 10 vials (30)	27	27.3	3	100
Total (102)	99	100	3	100
Chi^2 – 7.418				
df – 1				
p – 0.006 (SIGNIFICANT)				

Number and dosage of ASV has significant correlation with patient outcome

TABLE 26 :- ANAPHYLAXIS TO ASV AND OUTCOME

ANAPHYLAXIS TO ASV	OUTCOME			
	ALIVE		DEATH	
	NO	%	NO	%
Present (39)	39	39.4	-	-
Absent (63)	60	60.6	3	100
Total (102)	99	100	3	100
Chi^2 – 1.913				
Df – 1				
p – 0.167 (not significant)				

In this study anaphylaxis to ASV is not influencing the mortality outcome.

TABLE 27: COMPLICATIONS & OUTCOME

Complications		Outcome			
		Alive		Death	
		No	%	No	%
PRESENT (23)	Renal failure	7	5.7	1	33.3
	Encephalopathy	1	0.8	-	
	Respiratory failure	7	5.7	-	
	Respiratory failure & Encephalopathy	1	0.8	1	33.3
	Gangrene	3	2.4	-	
	DIC	1	0.8	-	
	DIC & Encephalopathy	-	-	1	33.3
ABSENT(103)		100	83.7	-	-
TOTAL (126)		123	100	3	100
Chi^2- 66.841					
df- 7					
p- 0.000(significant)					

In this study we were able to document significant correlation between the complications of snake bite and mortality.

TABLE 28 :- AGE AND COMPLICATIONS

AGE GROUP	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Up to 4 years(15)	3	13.0	12	11.7
5 – 8 yrs(42)	5	21.7	37	35.9
9 – 12 yrs(69)	15	65.2	54	52.4
Total	123	100	3	100
Chi^2- 1.727				
df-2				
p-0.422 (not significant)				

There is no significant correlation between the age of the patient and complications of snake bite.

TABLE 29:- SEX AND COMPLICATIONS :

SEX	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Males (89)	17	73.9	72	69.9
Females (37)	6	26.1	31	30.1
Total (126)	23	100	103	100
Chi – 0.146				
df - 1				
p – 0.703				

In this study there is no correlation between sex of the patient and complication s of snake bite.

TABLE 30:- DURATION BETWEEN BITE TO NEEDLE TIME AND COMPLICATIONS

DURATION BETWEEN BITE TO NEEDLE TIME	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Less than 4 hours (67)	3	13.0	64	62.1
More than 4 hours (59)	20	87.0	39	37.9
Total (126)	23	100	103	100
Chi – 18.199				
df-1				
p-0.000 (significant)				

There is significant correlation between the bite to needle time and the complication. Later the initiation of ASV , more the complication.

TABLE 31:- AREA OF LIVING AND COMPLICATIONS

LIVING	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Rural (85)	20	87.0	65	63.1
Urban (41)	3	13.0	38	36.9
Total (126)	23	100	3	100
Chi^2-4.872				
df-1				
p-0.027(significant)				

Most of the complications occurred in patients coming from rural area, accounting to 87%.

TABLE 32: SITE OF BITE & COMPLICATIONS

SITE OF BITE	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Upper Limb (29)	2	8.7	27	26.2
Lower Limb (95)	21	91.3	76	71.8
Others (2)	0	-	2	2.0
Total (126)	23	100	103	100
Chi^2-3.898				
df-2				
p-0.142(Not significant)				

Site of bite had no correlation with complications of snake bite.

TABLE 33:- FANGMARK AND COMPLICATIONS

FANG MARK	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Present(91)	22	95.7	69	67.0
Absent (35)	1	4.3	34	33.0
Total (126)	23	100	103	100
Chi^2-7.699				
df-1				
p-0.006(SIGNIFICANT)				

Fang mark was present in 95.7% of patients who had complications.

TABLE 34:- RELATION BETWEEN BITE TO NEEDLE TIME AND COMPLICATIONS (IN FANGMARK POSITIVE PATIENTS)

BITE TO NEEDLE TIME (FANG MARK POSTIVE'S)	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Less than 4 Hours (37)	2	9.1	35	54.7
More than 4 Hours (54)	20	90.9	34	49.3
Total (91)	22	100	69	100
Chi^2-11.984				
df-1				
p-0.001 (SIGNIFICANT)				

Of the total 91 who had fang mark, 54 patients had late initiation (ie. >4hrs) of ASV. Among them 90.9% had complications, which is highly significant.

TABLE 35 :- CELLULITIS AND COMPLICATIONS

CELLULITIS	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Present(90)	23	100	67	65.0
Absent (36)	0	-	36	35.0
Total (126)	23	100	103	100
Chi^2-11.254				
df-1				
p-0.001(significant)				

The occurrence of complications were high among patients who had cellulitis.

TABLE 36 :- LIMB INVOLVEMENT AND COMPLICATIONS (IN CELLULITIS PATIENTS)

LIMB INVOLVEMENT (IN CELLULITIS PATIENTS)	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Upper limb (66)	2	8.7	20	30.8
Lower limb (22)	21	91.3	45	69.2
Total (88)	23	100	65	100
$Chi^2 – 4.412$				
df – 1				
p – 0.035 (SIGNIFICANT)				

Patients who had lower limb cellulitis had significant complications.

TABLE 37:- BITE TO NEEDLE TIME AND COMPLICATIONS (IN CELLULITIS PATIENTS)

BITE TO NEEDLE TIME (IN CELLULITIS PATIENT)	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Less than 4 hours (47)	3	13.0	44	65.6
4 – 8 hrs (33)	15	65.3	18	26.9
8 – 12 hrs (5)	3	13.0	2	3.0
More than 12 hours (5)	2	8.7	3	4.5
Total (90)	23	100	67	100
Chi^2 - 19.616				
df – 3				
p - 0.000 (SIGNIFICANT)				

In patients with celllulitis the bite to needle time had significant correlation with the occurrence of complications.

TABLE 38 :- PRE HOSPITAL TREATMENT AND COMPLICATIONS

PRE HOSPITAL TREATMENT		COMPLICATIONS			
		PRESENT		ABSENT	
		NO	%	NO	%
Given (64)	Injection (34)	9	39.3	25	24.6
	Incision at bite (8)	7	30.3	1	0.1
	ASV (20)	3	13.0	17	16.6
	Incision+ASV(2)	0	-	2	1.9
Not given (62)		4	17.4	58	56.8
Total (126)		23	100	103	100
Chi^2-21.543					
df-4					
p-0.000 (significant)					

Out of the 23 patients with complications,19 (ie. 82.6%) patients had undergone pre hospital treatment.

TABLE 39: TYPE OF BITE & COMPLICATIONS

TYPE OF BITE		COMPLICATIONS			
		PRESENT		ABSENT	
		NO	%	NO	%
Poisonous (102)	Hemotoxic (65)	13	56.5	52	50.5
	Neurotoxic (15)	10	43.5	5	4.9
	Only Cellulitis (22)	0	-	22	21.4
Non poisonous(24)		0	-	24	23.2
Total		23	100	103	100
Chi^2-33.915					
df-3					
p-0.000 (SIGNIFICANT)					

Complication rate was high in patients with poisonous snake bite, among them 56.5% occurred in hemotoxic type.

TABLE 40:- DOSAGE OF ASV AND COMPLICATONS

DOSAGE OF ASV	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Less than 10 vials	0	-	72	91.1
More than 10 vials	23	100	7	8.9
Total (102)	23	100	79	100
Chi^2-71.271				
df-1				
p-0.000(SIGNIFICANT)				

Patients with complications of snake bite required more number of ASV, signifies severe the envenomation ,higher the complication rate.

TABLE 41 :- ANAPHYLAXIS TO ASV AND COMPLICATIONS

ANAPHYLAXIS TO ASV	COMPLICATIONS			
	PRESENT		ABSENT	
	NO	%	NO	%
Present	1	4.3	38	48.1
Absent	22	95.7	41	51.9
Total (102)	23	100	79	100
Chi^2-14.440				
df-1				
p-0.000(significant)				

There is no significant correlation between anaphylaxis to ASV and occurrence of complications pertaining to snake bite.

DISCUSSION

A prospective study was conducted in 126 children with snake bite admitted in Tirunelveli medical college hospital over a period of 22 months.

Of the 126 children evaluated, most of the children were under the age group of 9 – 12 years (54.8%). The second most common group was 5 – 8 years (33.3%). The mean age was 8.14 years. The mean duration of hospital stay was 6.67 days.

Majority of the children were males constituting about 70.6% and the remaining were females(29.4%). The bites were more common in the rainy season between the months of September to December. The most common site of bite is in lower limbs which was seen in 95 cases (75.4%). The lower limb to upper limb ratio was 3:1.

Children from rural area had more common occurrence of snake bite than urban area contributing to 67.5% of the total patients.

Only 53.2% of the population were brought to the hospital within 4 hours of bite. The remaining 46.8% children were admitted after 4 hours of snake bite. Of the 46.8%, 6.3% of the study population were brought to the hospital after a delay of 12 hours.

Out of the 126 children, 64 were given some type of pre hospital treatment like injection TT, incising the site of bite or ASV etc. Among them only 20 had received ASV constituting to about 15.8%. The ASV that was given in the peripheral centers is less than 10 vials in all the 20 cases. 62 children were admitted to the hospital directly without any treatment.

Fang mark was present in 91 cases (ie) in 71%. . But the decision on envenomation depending upon the fang mark is not reliable, because fang mark may or may not be present in poisonous bites and non poisonous bites can also have fang mark.

Poisonous snake bite accounted to 81%. The most common type of bite was hemotoxic accounting to 51.6% (65) of the total cases compared to neurotoxic, 11.9% (15) cases. This is in contrast to the studies conducted by Sharma et al & Bharadwaj et al in North India in which they showed that there is a high number of Elapid bites.

Cellulitis was present in 71.4% of children either at admission or during the course of hospital stay. The serious complications encountered with snake bite like renal failure, encephalopathy, respiratory failure, gangrene & DIC were present in 18.3% of children. Remaining 103 children were devoid of complications.

ASV was the prime modality of treatment.102 patients required treatment with ASV among which 23.8% warranted more than >10 vials. 39 patients had minor anaphylactic reactions to ASV like rash, nausea, vomiting, fever, chills, itching, hypotension. These reactions were effectively managed with intramuscular adrenaline,steroids and antihistaminics.

Only one fourth of the patients required other modalities of treatment like blood transfusion, ventilatory support and peritoneal dialysis.

The most common complication in our study was renal failure 8 cases(6.3%) and respiratory failure which occurred in 9 (7.2%) cases. This is similar to the study done by Adhisivam et al. Disseminated intravascular coagulation was seen in 2 cases, encephalopathy in 4 case, and gangrene in 3 case. Complications were common among cases which arrived after 4 hrs of bite. Complications were managed with blood component transfusion (11), fasciotomy (6), dialysis (2) and ventilator support (9).

Out of 126 children, 3 patients died. Mortality rate to snake bite admitted in our hospital was 2.4% which is comparable to the mortality rate (3.5%) in the study conducted by Sharma et al. Death due to hemotoxic bite was 66.7% (2 cases) and the remaining 33.3% (1 case) was due to neurotoxic bite. Morbidity was high in patients with poisonous snake bite, mainly hemotoxic type.

The cases which arrived late (> 4 hrs) had a higher percentage of mortality. Patients with complications to snake bite had higher mortality.

In this study the age, sex of the patient and the site of bite had no influence upon the morbidity parameters. Living area , type of bite, presence of fang mark / cellulitis, pre hospital treatment and the bite needle time had statistically significant correlation with the morbidity parameters.

Of the total 91 who had fang mark, 54 patients had late initiation (ie. >4hrs) of ASV. Among them 90.9% had complications, which is highly significant.

In patients with celllulitis , the bite to needle time had significant correlation with the occurrence of complications. The occurrence of complications were high among patients who had cellulitis especially with lower limb involvement.

Patients who had undergone pre hospital treatment had higher morbidity , indirectly pre hospital treatment delays the time of bite to needle. That is delayed initiation of ASV resulted in severe complications thereby mortality.

Patients with complications of snake bite required more number of ASV, signifies severe the envenomation higher the complication rate otherwise morbidity.

In our study the age ,sex of the patient, living area ,site of bite, type of bite ,presence of fang mark / cellulitis, pre hospital treatment and the bite needle time and anaphylaxis to ASV had no influence upon the mortality outcome .However mortality rate was higher among children of younger age group and in those who received ASV after 4 hours of snake bite. The main reason we can point out is that the mortality rate was very low in our study.

The outcome of the cases mainly depends upon the complications. The mortality was high in cases who had renal failure,repiratory failure, encephalopathy and DIC.

CONCLUSION

Snake bite is a common treatable problem in the rural areas of the country. In our study, hemotoxic snakes are the most common cause of bites.

In our study we found that late initiation of ASV among fang mark positive and cellulitis positive patients had higher complication rate thereby mortality.

The complications and mortality were high in cases who arrived late. In this study all the complications related to snake bite were effectively managed with supportive measures like dialysis, blood transfusion and ventilator therapy .

There was no mortality due to anaphylactic reactions to ASV. So ASV can be safely administered in peripheral health centers and if at all anaphylaxis occurs they can be easily managed.

So we conclude that early and appropriate use of anti snake venom helps in reducing the morbidity thereby mortality. So early referral and early administration of ASV is life saving.

LIMITATION OF THE STUDY

- The major limitation of study was that we were not able to obtain long term follow up
- This study was conducted in a tertiary set up hospital which cannot be applied in the community level directly.
- We were not able to separate dry bite by poisonous snake and non poisonous snake clinically.

RECOMMENDATIONS

- Educate the rural people regarding the hazards of the snake bite, the first aid measures and the importance of early referral to hospital.
- Antisnake venom should be readily available in peripheral health centers in adequate amounts and most of the cases can be treated in peripheral centers successfully.
- Early referral to tertiary hospital reduces the mortality in patients with complications of snake bite.

SUMMARY

Objective:

To study the clinical profile and outcome of snake bite in children.

Methods:

It is a prospective study conducted in Tirunelveli Medical College, Tirunelveli

Results:

A total of 126 cases were studied over a period of 22 months. Hemotoxic snakes accounted for most of the bites. The cases which arrived late after the bite suffered more complications and mortality. The most common complication in this study was acute renal failure and respiratory failure. The mortality rate was 2.4%.Delayed initiation of ASV among fang mark positive and cellulitis positive patients had more complications. Patients with complications had a high mortality rate. So early recognition, administration of ASV and referral to higher centers in cases with complications helps in reducing morbidity and mortality.

ABBREVIATIONS

- ASV – Anti Snake Venom
- BP – Blood Pressure
- DIC – Disseminated Intravascular Coagulation
- FFP – Fresh Frozen Plasma
- Hg – Mercury
- HR – Heart Rate
- IM – Intramuscular
- IV – Intravenous
- PHC – Primary Health Centre
- PR – Pulse Rate
- RR – Respiratory Rate
- SD – Standard Deviation
- WBCT – Whole Blood Clotting Test
- WHO – World Health Organisation

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CLINICAL PROFILE OF SNAKE BITE IN CHILDREN

TIRUNELVELI MEDICAL COLLEGE HOSPITAL

NAME: AGE: SEX: RURAL/URBAN:

SYMPTOMS:

TIME OF BITE:

TIME OF ARRIVAL TO HOSPITAL:

SITE OF BITE:

LOCATION OF BITE:

TYPE OF SNAKE: TOLD/BROUGHT

PAIN:

SWELLING:

BLEEDING FROM LOCAL SITE:

BLEEDING FROM GUMS:

VOMITING:

HEADACHE:

INCREASED SALIVATION:

SWEATING:

PTOSIS:

OLIGURIA:

HEMATURIA:

RESPIRATORY DISTRESS:

H/O OF FIRST AID: TUNICAE/ I&D/ INJECTIONS

ON EXAMINATION:

PR	RR	BP	CRT	TEMP

CONSCIOUS:

BLEEDING FROM GUMS:

PTOSIS:

RESPIRATORY DISTRESS:

LOCAL EXAMINATION:

FANG MARKS:

SWELLING:

TENDERNESS:

BLISTERS:

ECHYMOSIS:

BLEEDING:

NECROSIS:

LYMPHADENOPATHY:

CARDIOVASCULAR SYSTEM:

RESPIRATORY SYSTEM:

CENTRAL NERVOUS SYSTEM:

ABDOMEN EXAMINATION:

INVESTIGATIONS:

BLEEDING TIME:

CLOTTING TIME:

COMPLETE BLOOD COUNT:

BLOOD UREA

SERUM CREATININE:

TREATMENT:

GRADING OF ENVENOMATION:

TIME OF START OF ANTIVENOM:

TIME OF COMPLETION OF ANTIVENOM:

NO OF VIALS OF ANTIVENOM USED:

COMPLICATIONS OF ANTIVENOM:

ANTIBIOTICS:

BLOOD TRANSFUSION:

COURSE IN HOSPITAL:

PROGRESSION OF CELLULITIS:

RENAL PARAMETERS:

ANY FURTHER ASV GIVEN:

DIALYSIS:

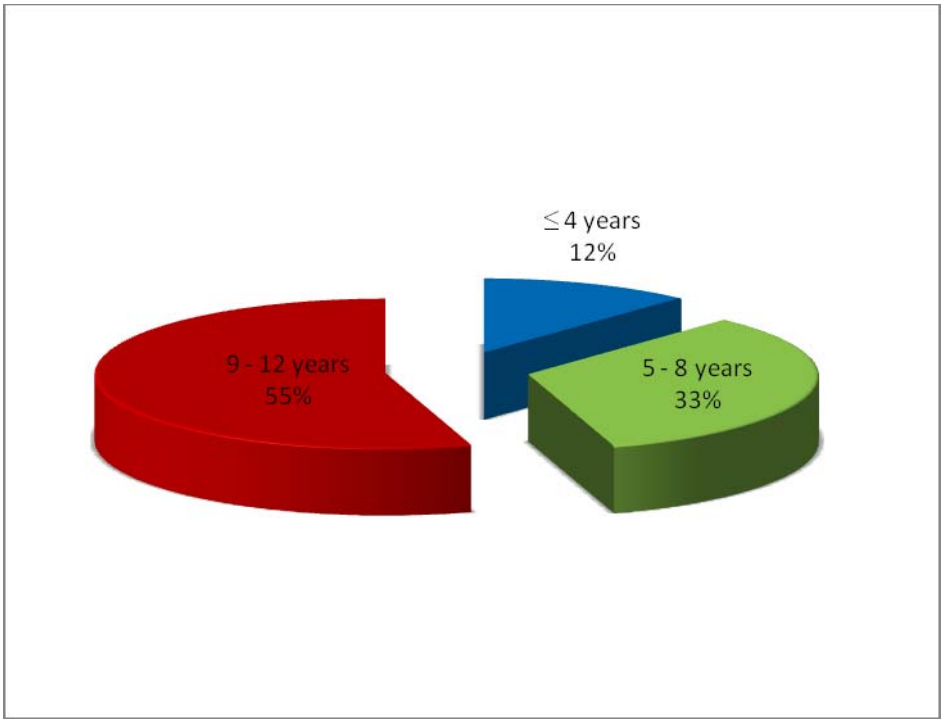
FASCIOTOMY:

RESPIRATORY SUPPORT:

DURATION OF HOSPITAL STAY:

OUTCOME

AGE DISTRIBUTION



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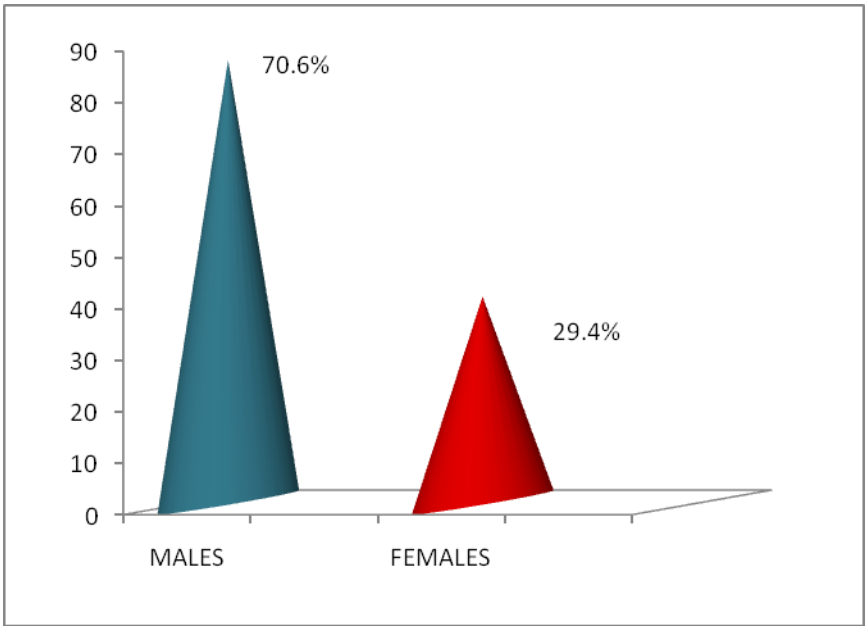
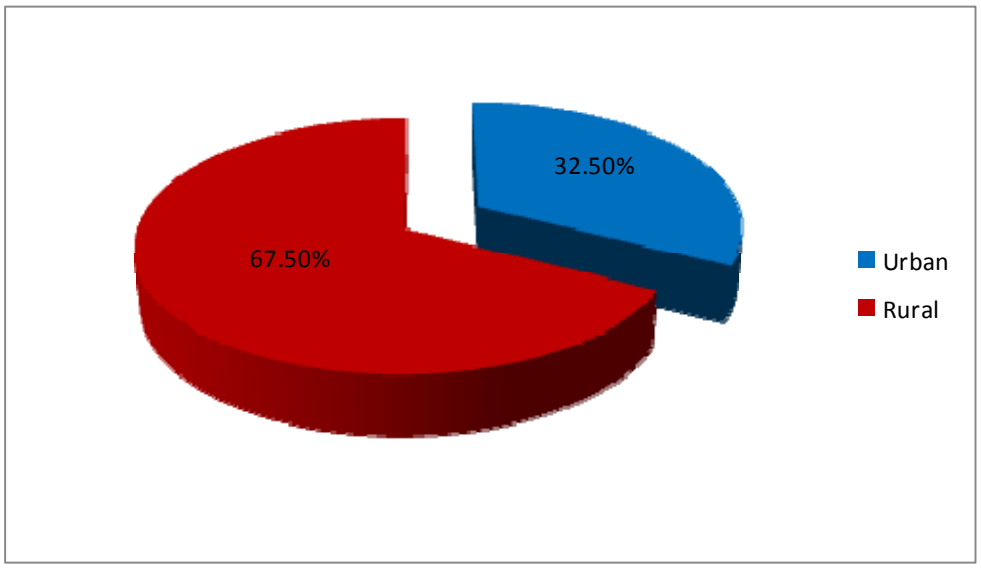
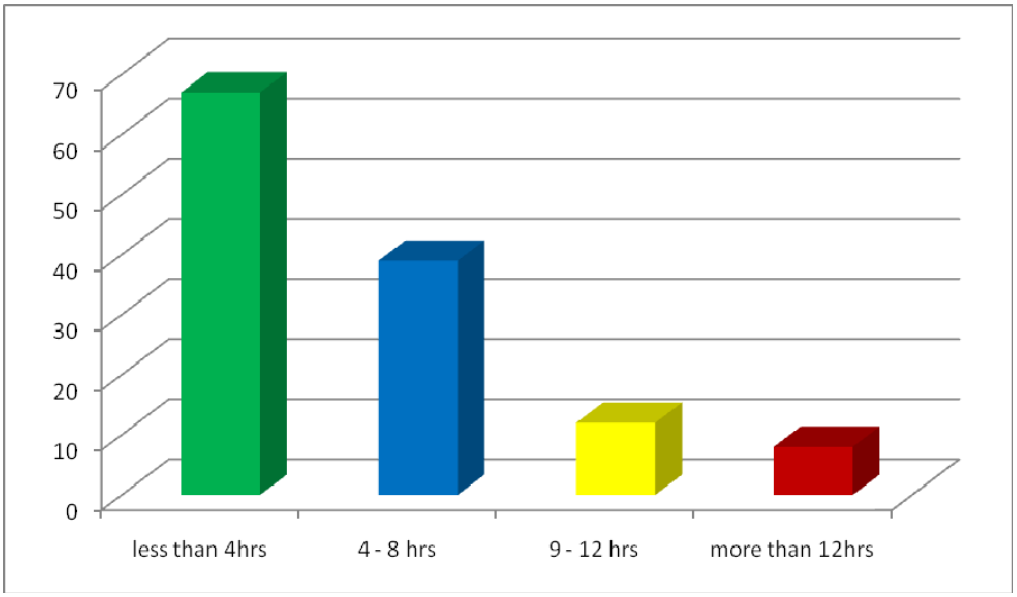


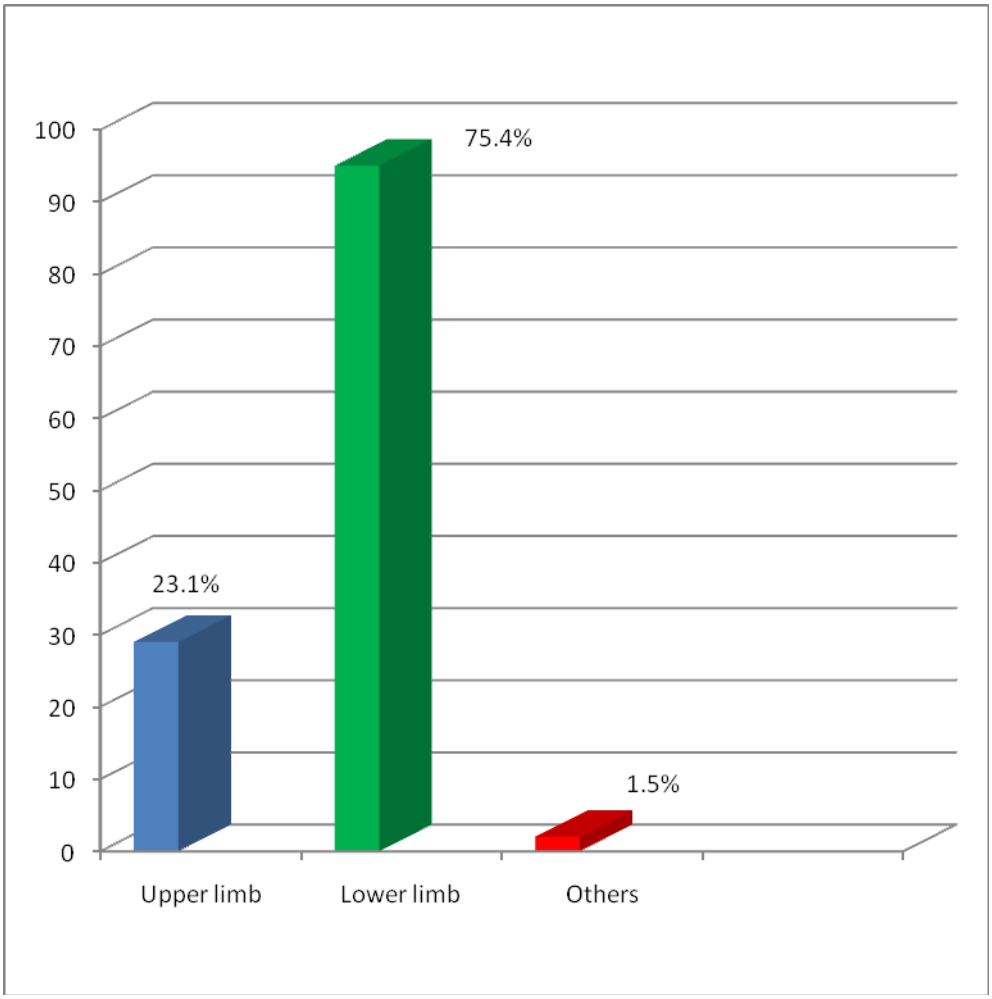
AREA OF LIVING



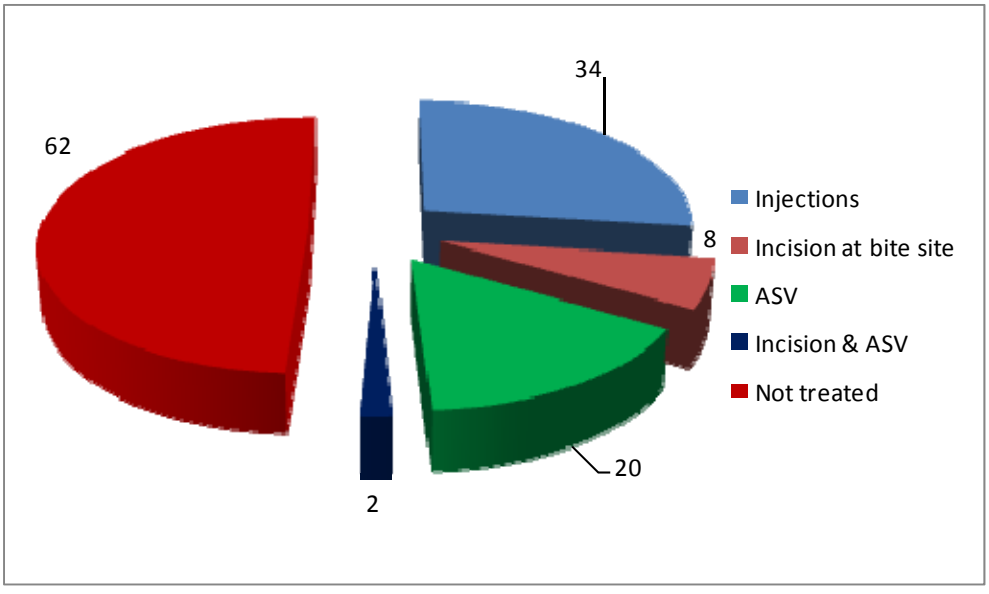
DURATION BETWEEN SNAKE BITE & NEEDLE TIME



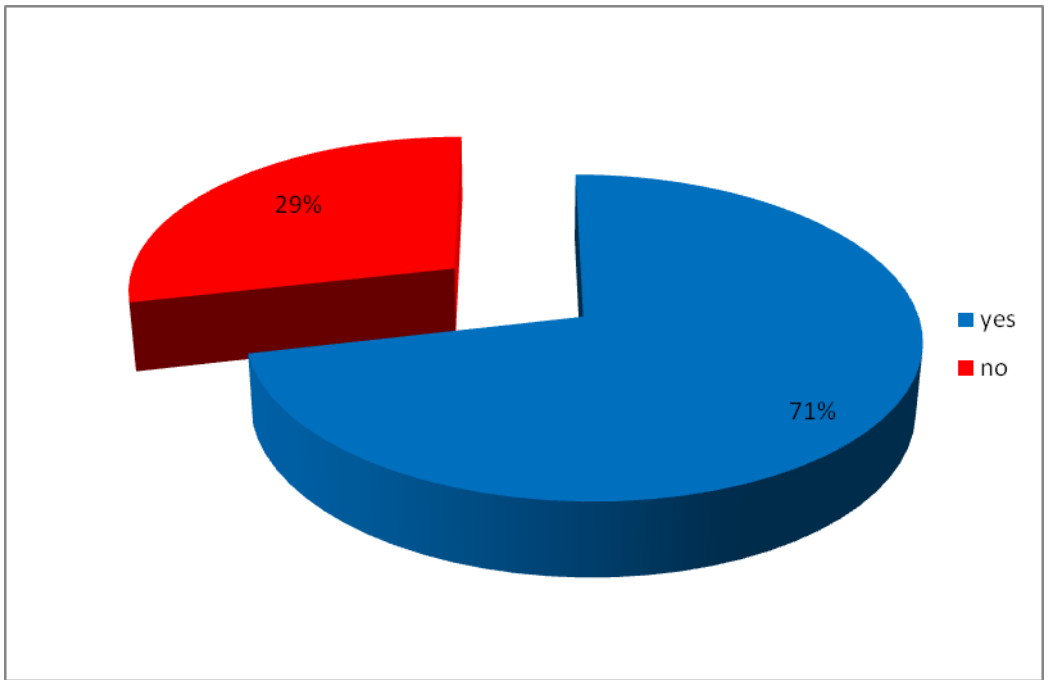
SITE OF BITE



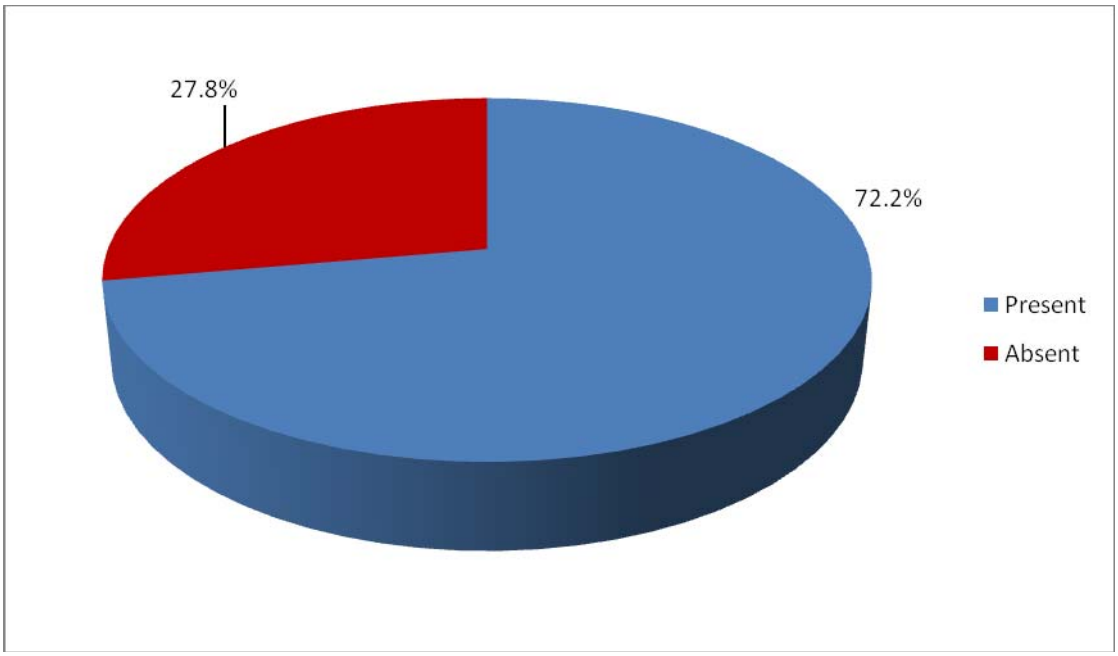
PRE HOSPITAL TREATMENT



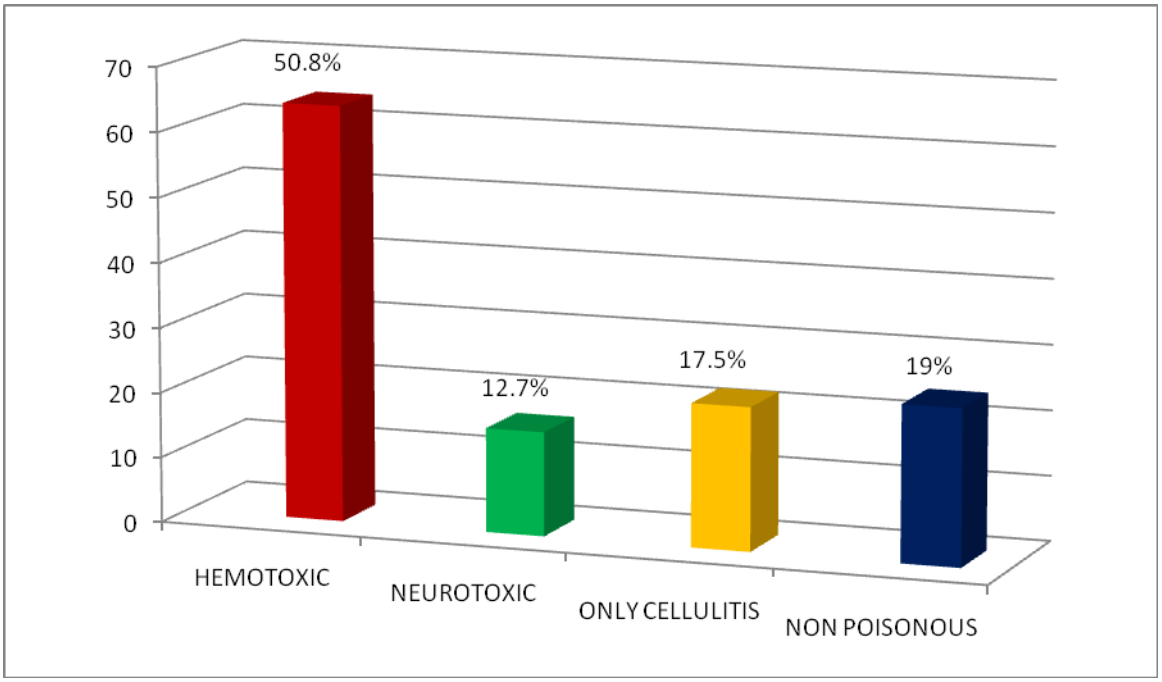
CELLULITIS



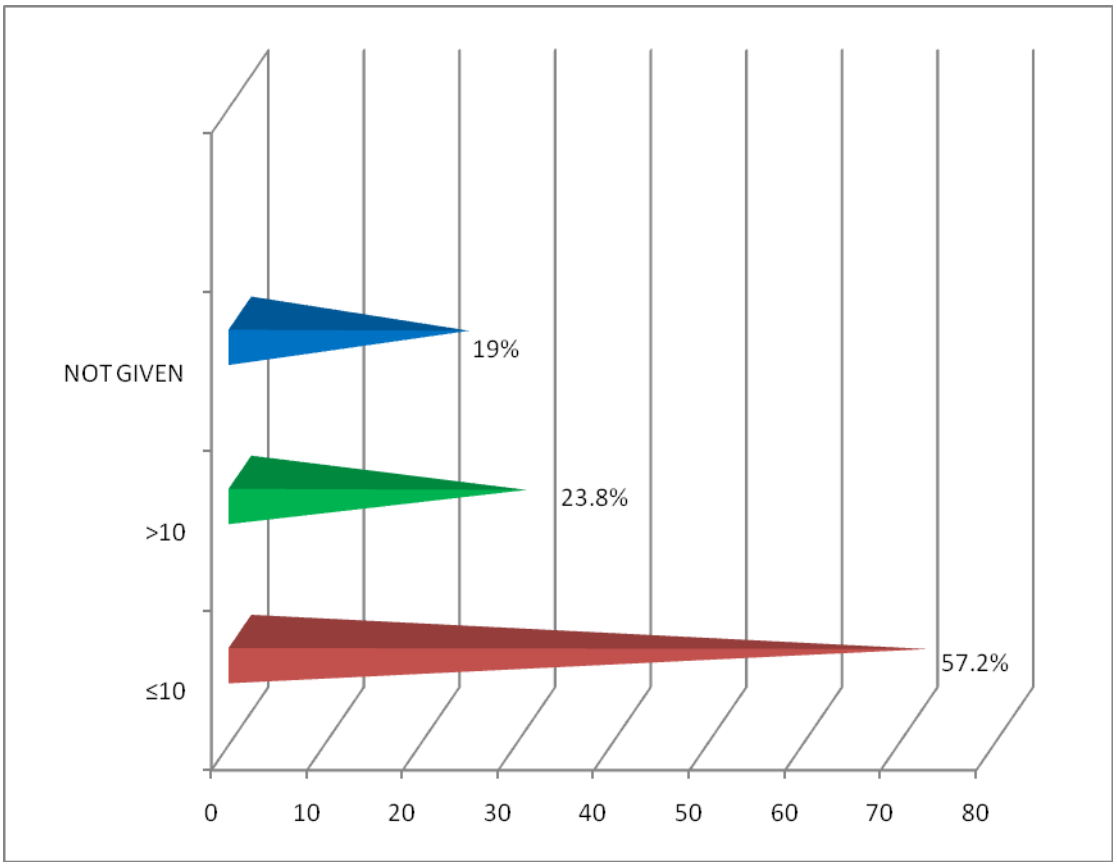
FANG MARK



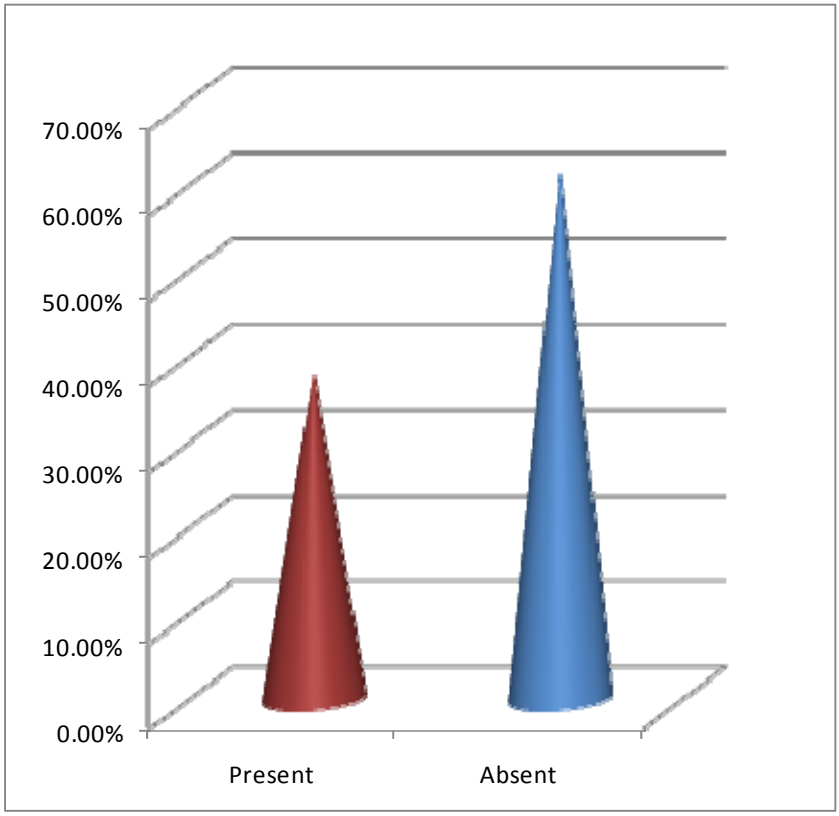
TYPE OF BITE



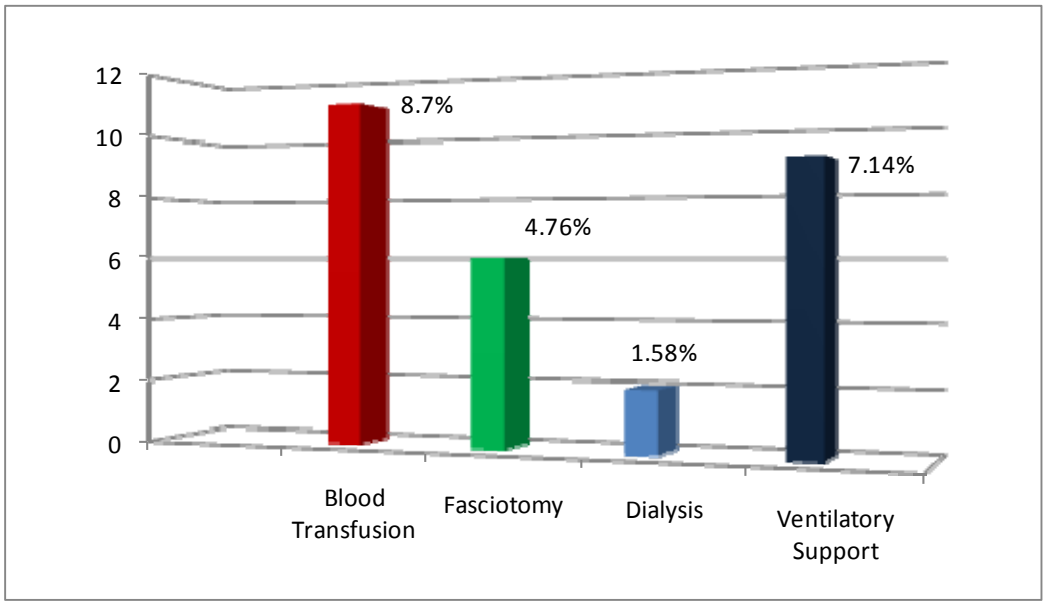
DOSAGE OF ASV



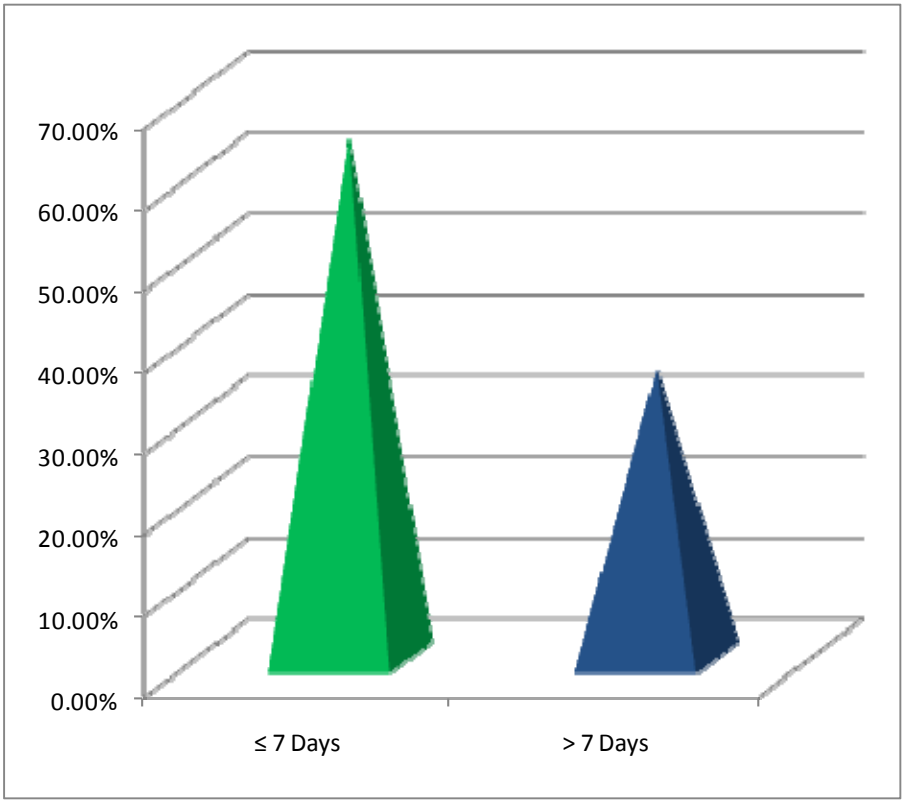
ANAPHYLAXIS TO ASV



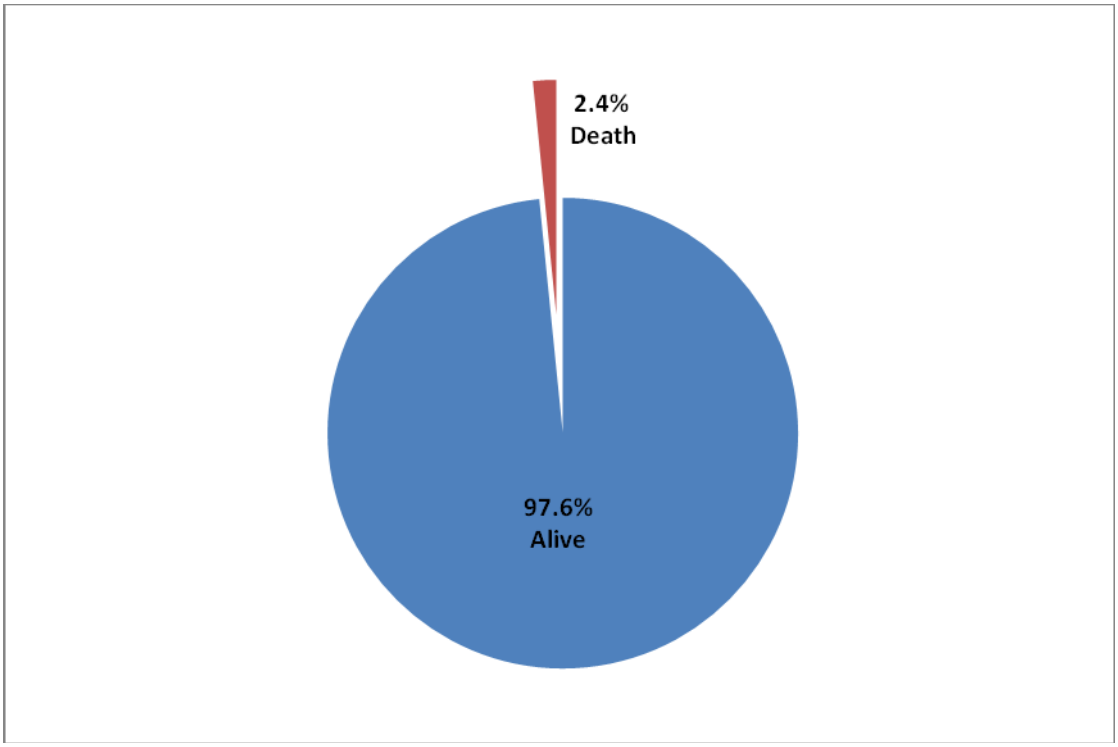
OTHER MODALITIES OF TREATMENT



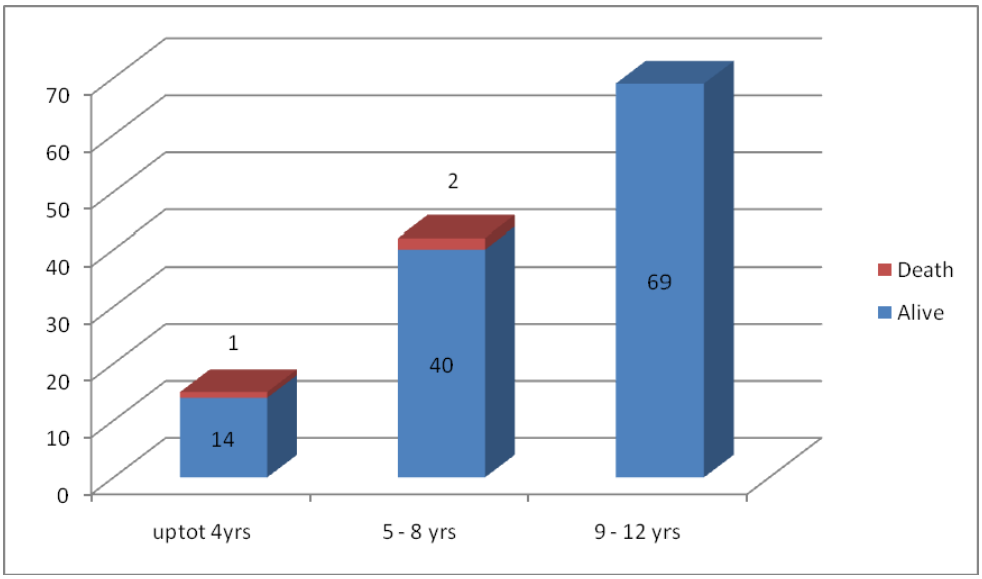
DURATION OF HOSPITAL STAY



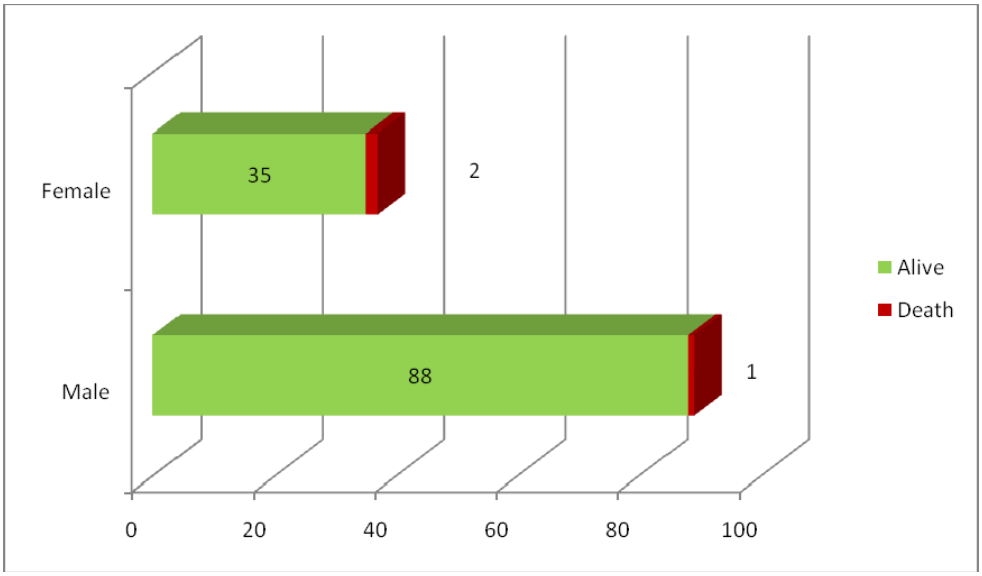
OUTCOME



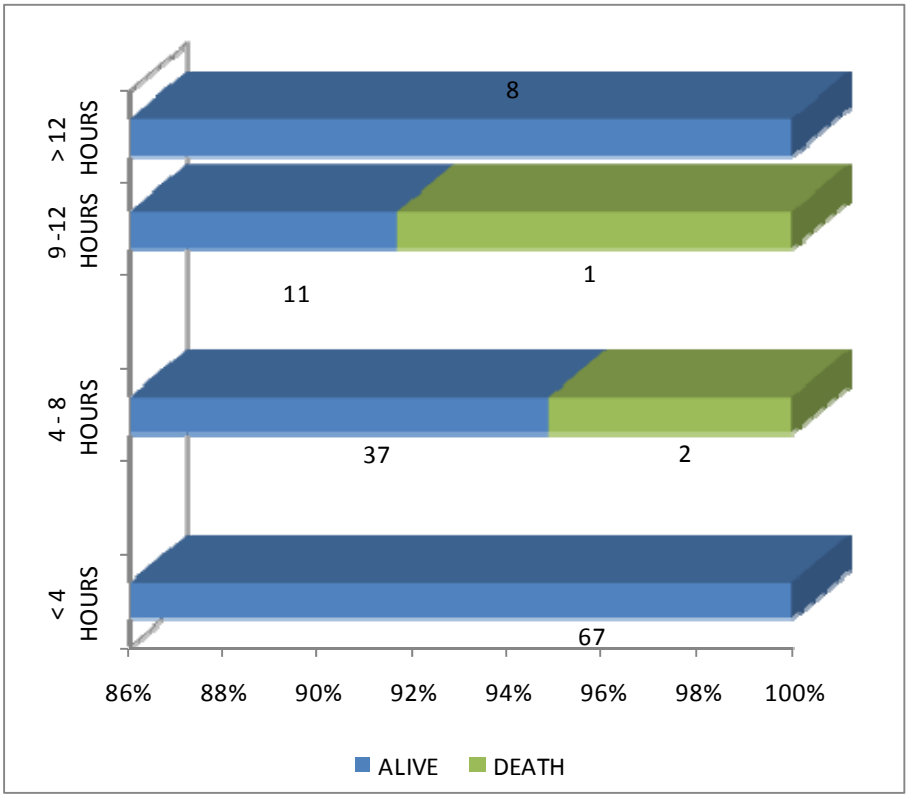
AGE AND OUTCOME



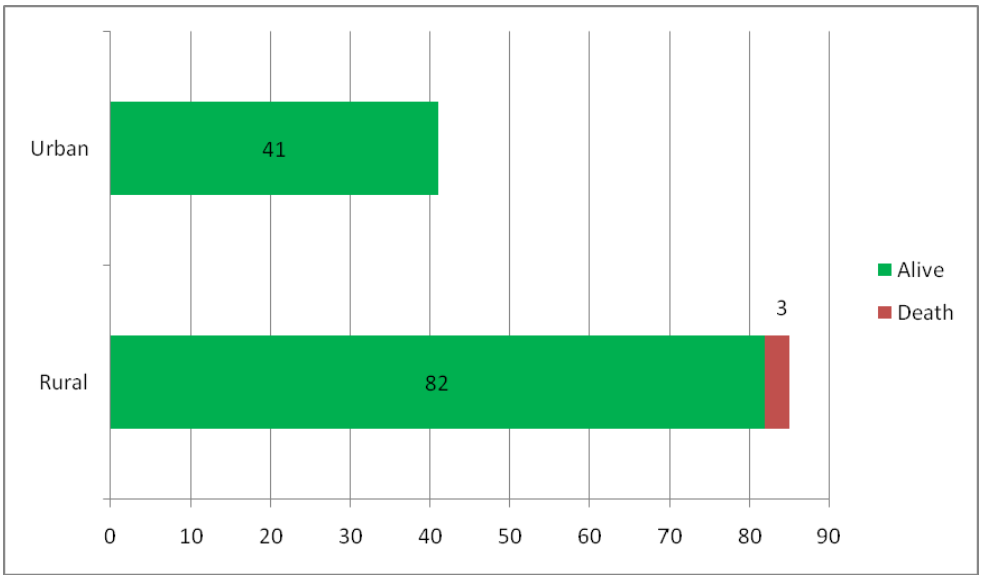
SEX AND OUTCOME



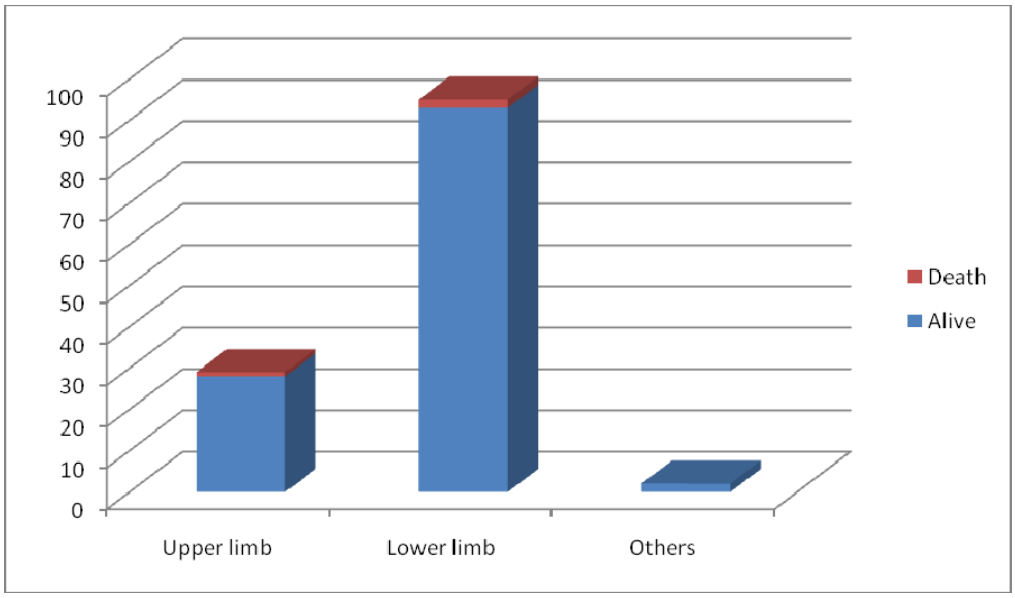
DURATION BETWEEN BITE TO NEEDLE TIME



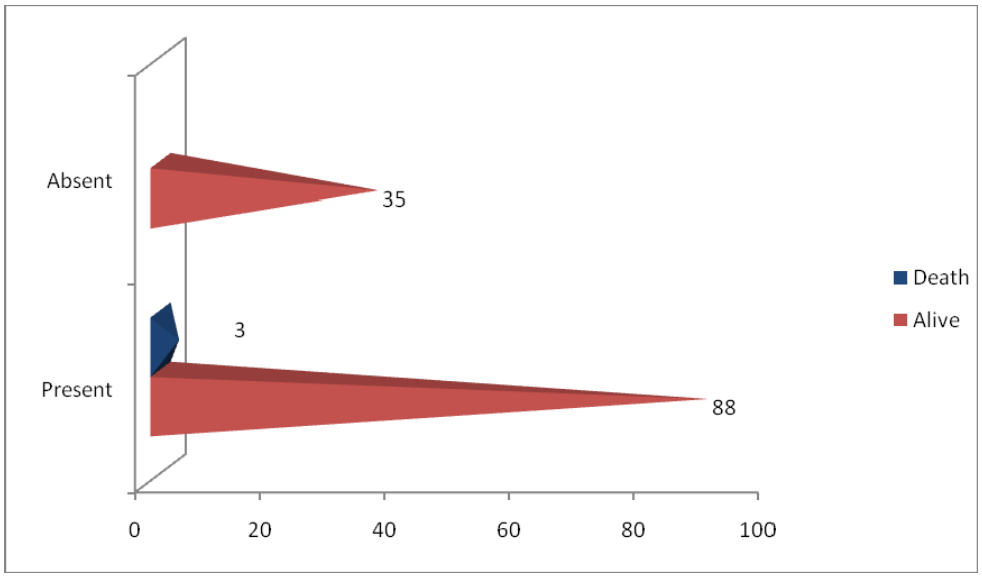
AREA OF LIVING AND OUTCOME



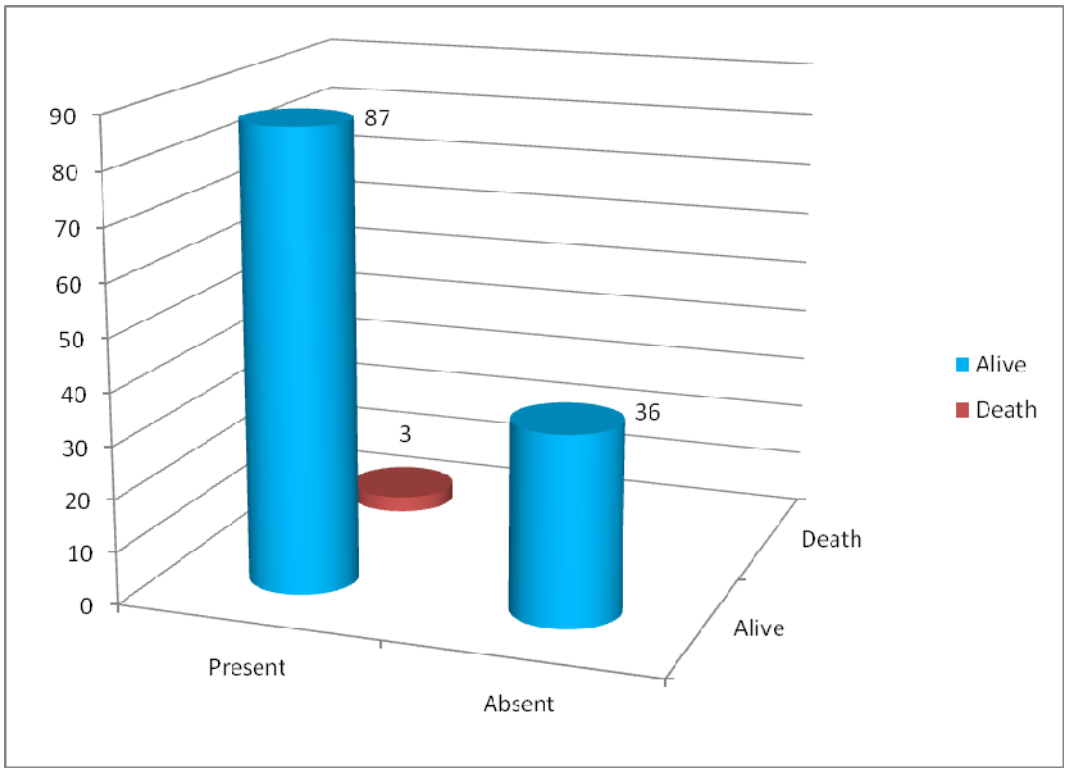
SITE OF BITE & OUTCOME



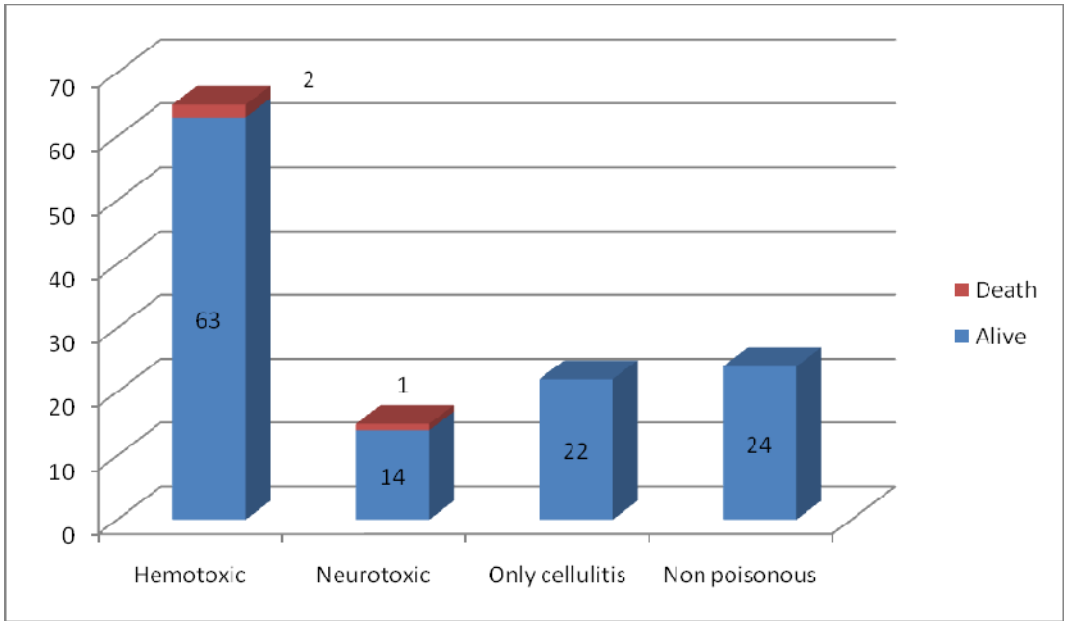
FANGMARK AND OUTCOME



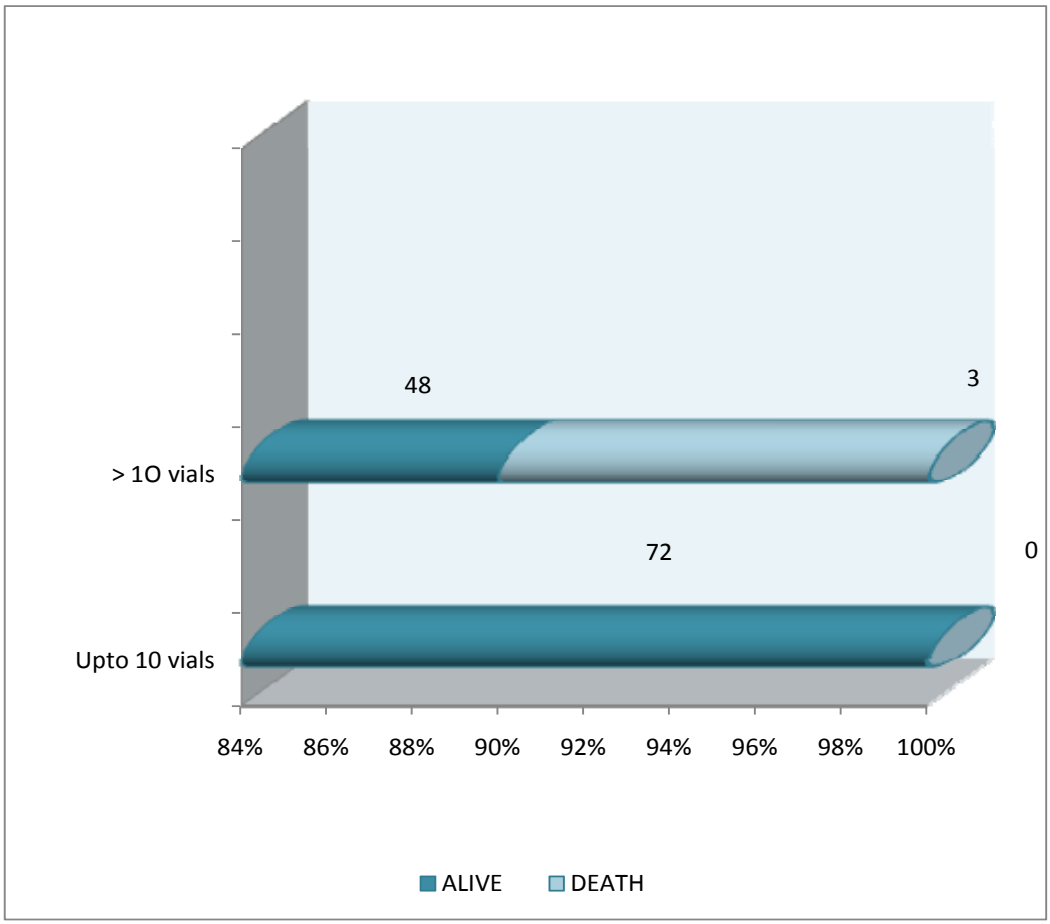
CELLULITIS AND OUTCOME



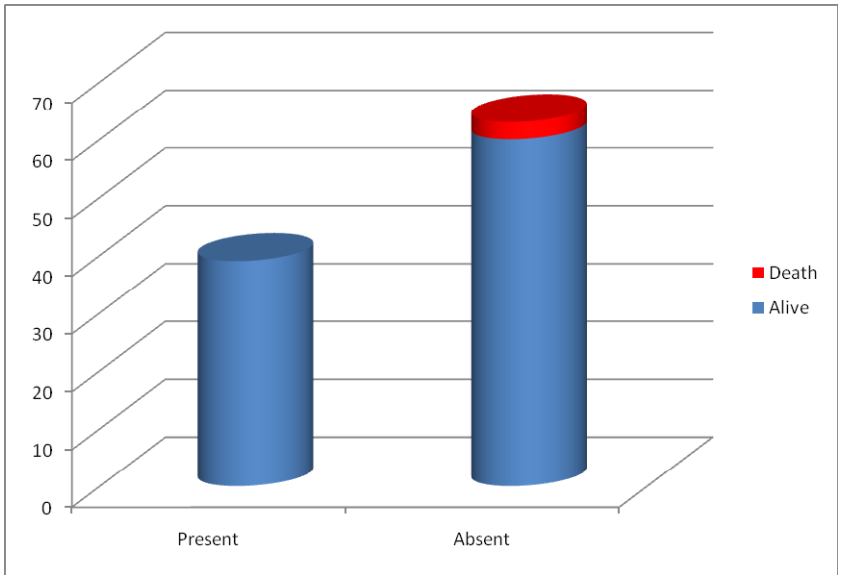
TYPE OF BITE & OUTCOME



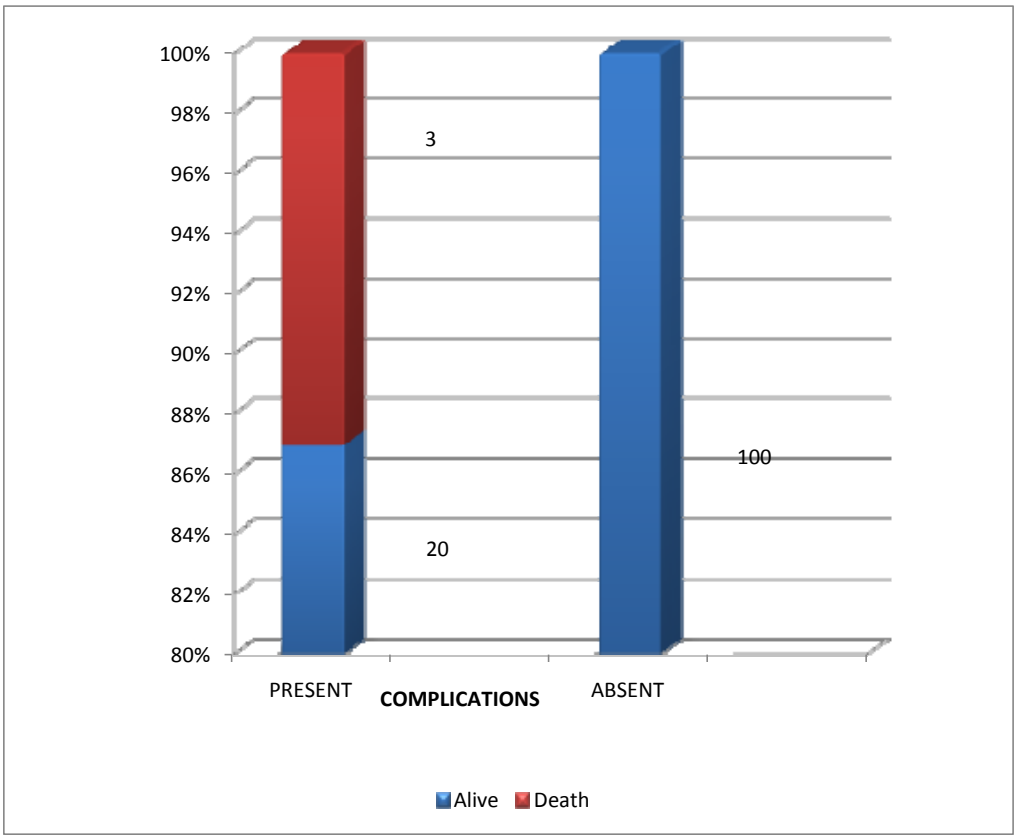
NUMBER OF ASV & OUTCOME



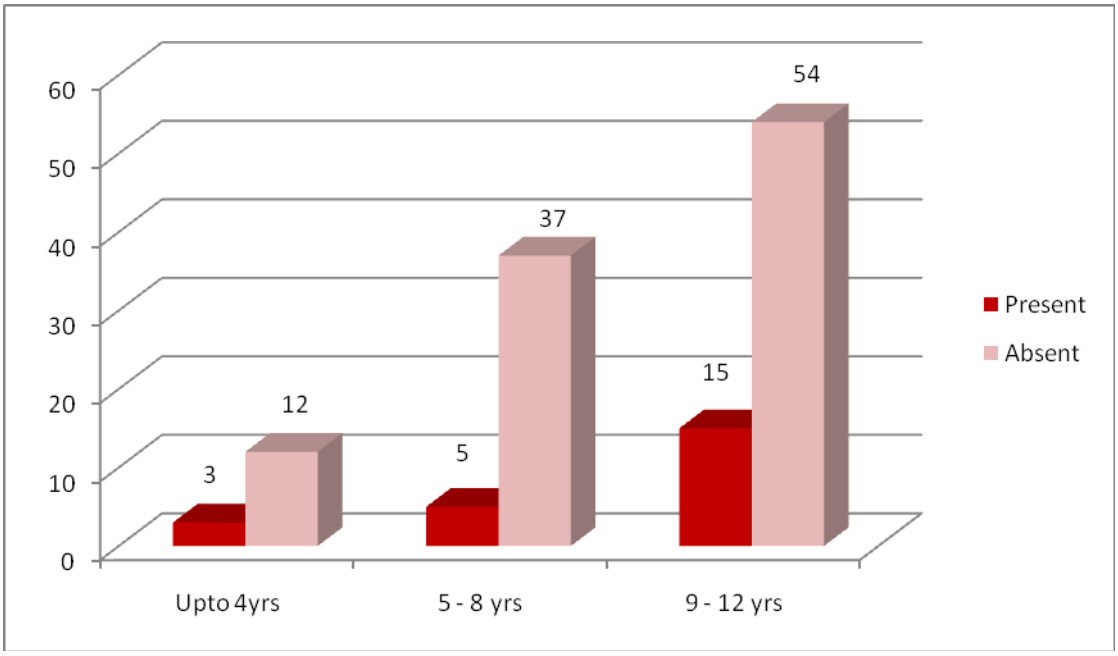
ANAPHYLAXIS TO ASV AND OUTCOME



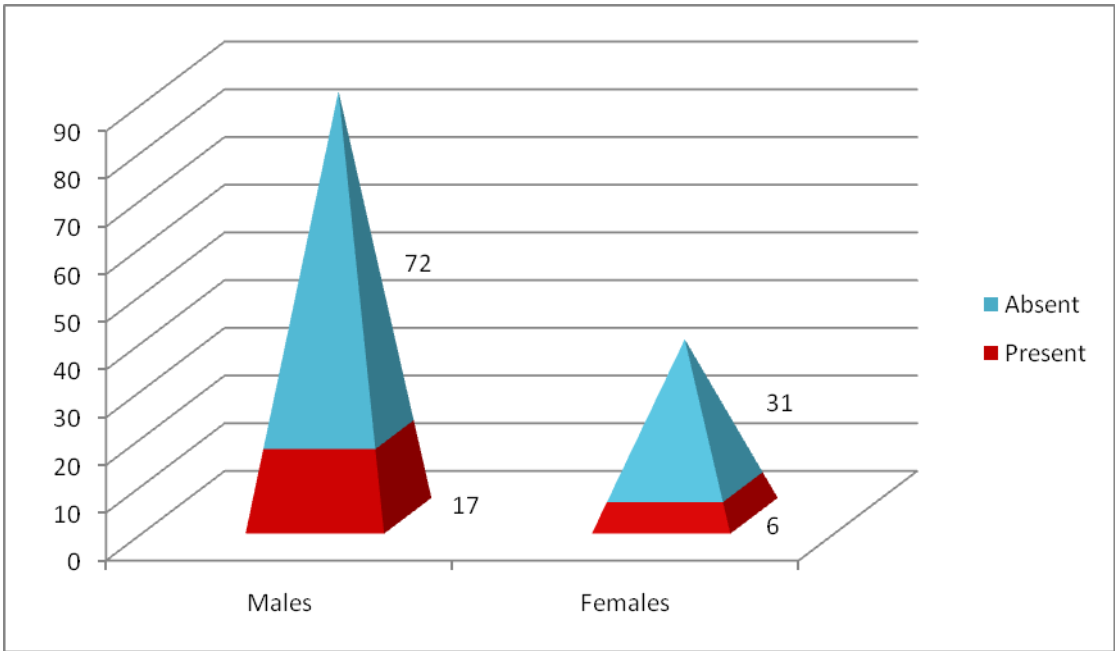
COMPLICATIONS AND OUTCOME



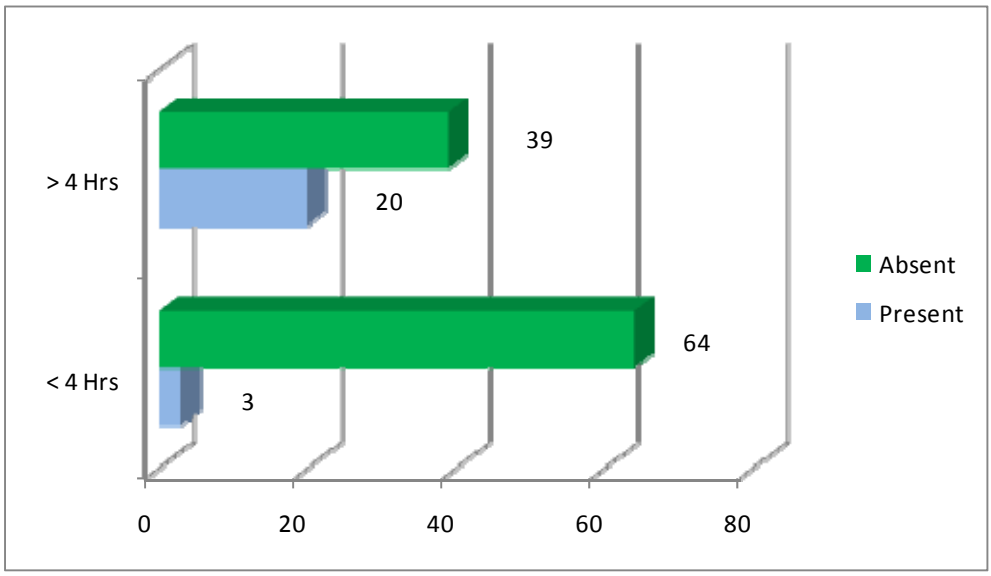
AGE AND COMPLICATIONS



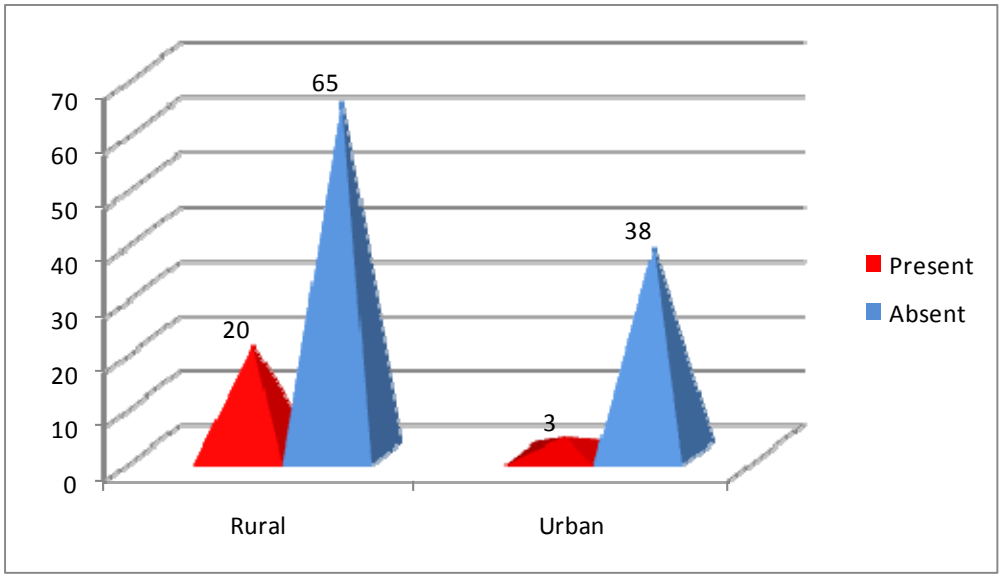
SEX AND COMPLICATIONS



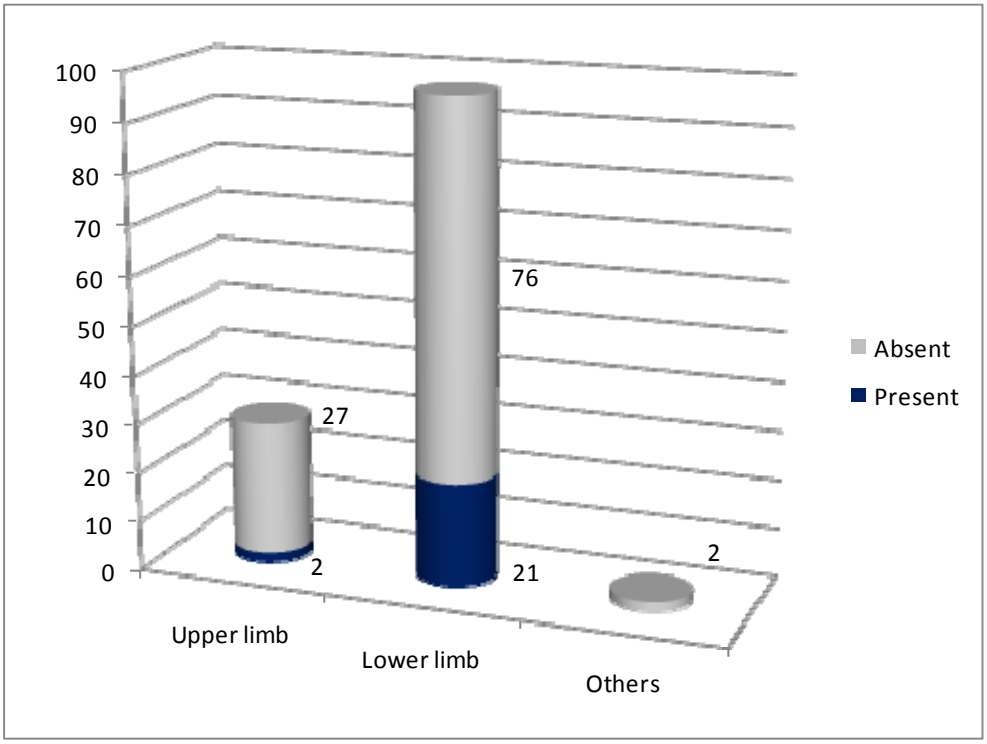
DURATION BETWEEN BITE TO NEEDLE TIME AND COMPLICATIONS



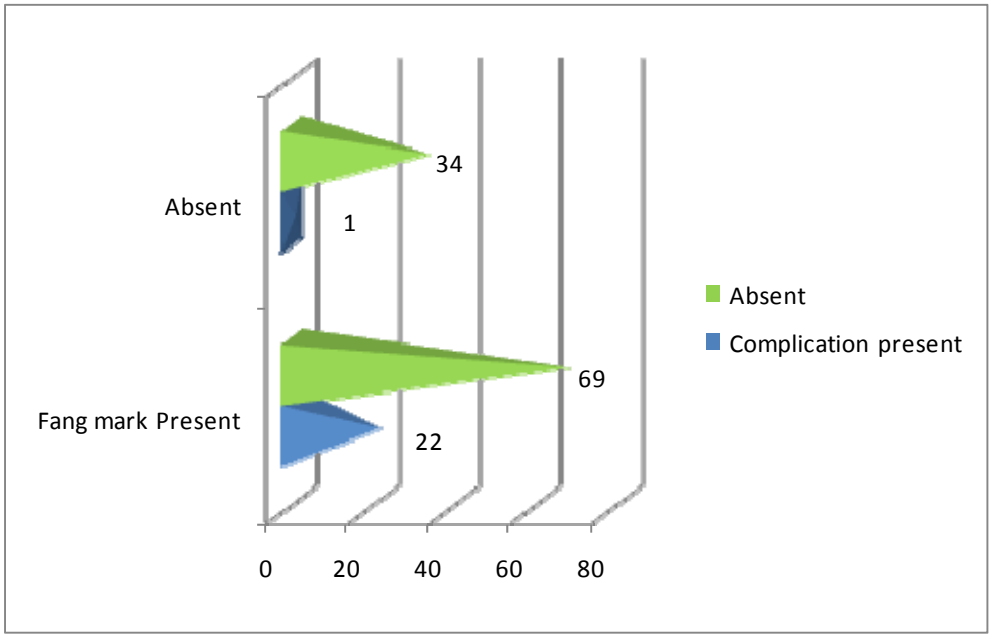
AREA OF LIVING AND COMPLICATIONS



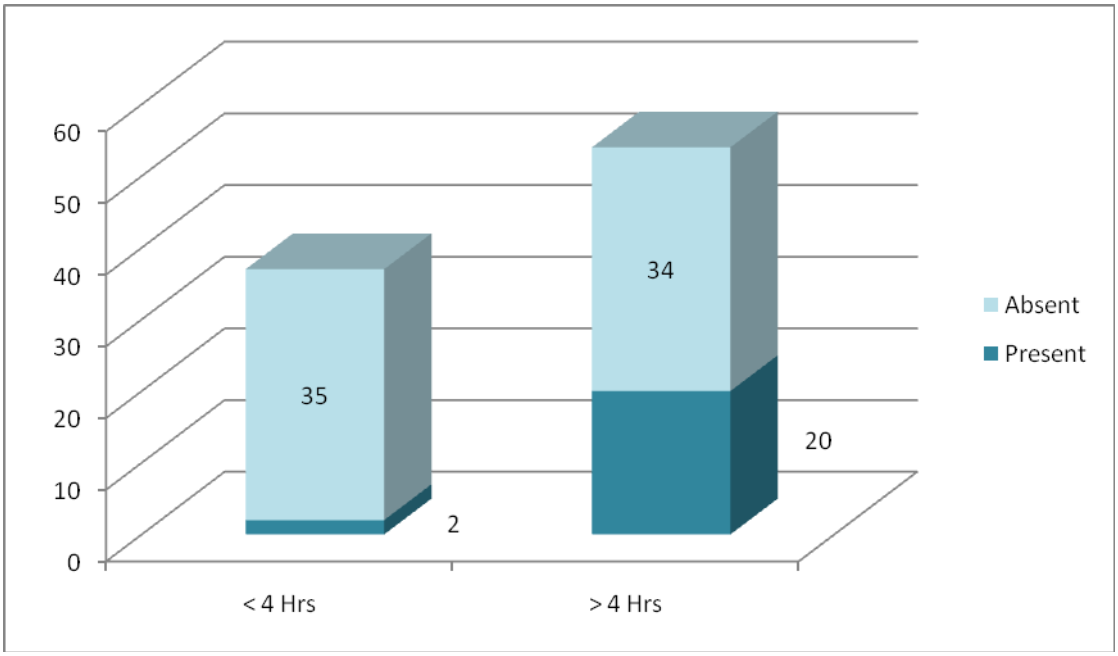
SITE OF BITE & COMPLICATIONS



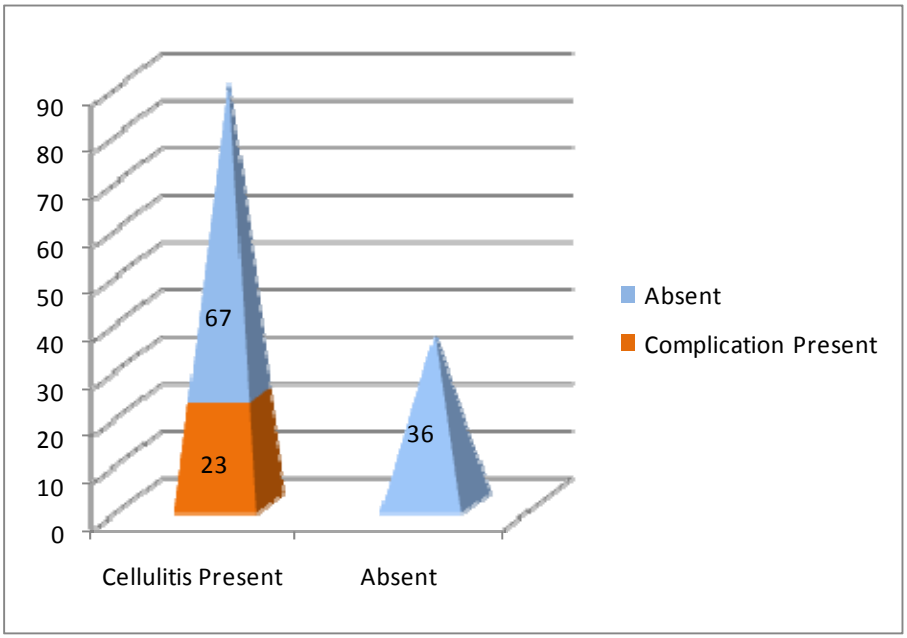
FANGMARK AND COMPLICATIONS



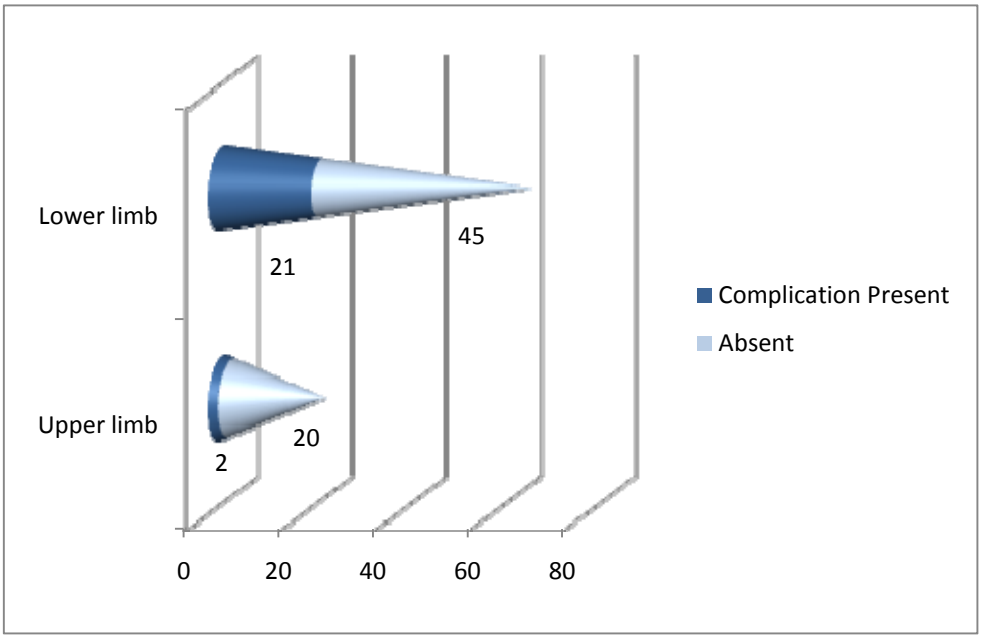
RELATION BETWEEN BITE TO NEEDLE TIME AND COMPLICATIONS (IN FANGMARK POSITIVE PATIENTS)



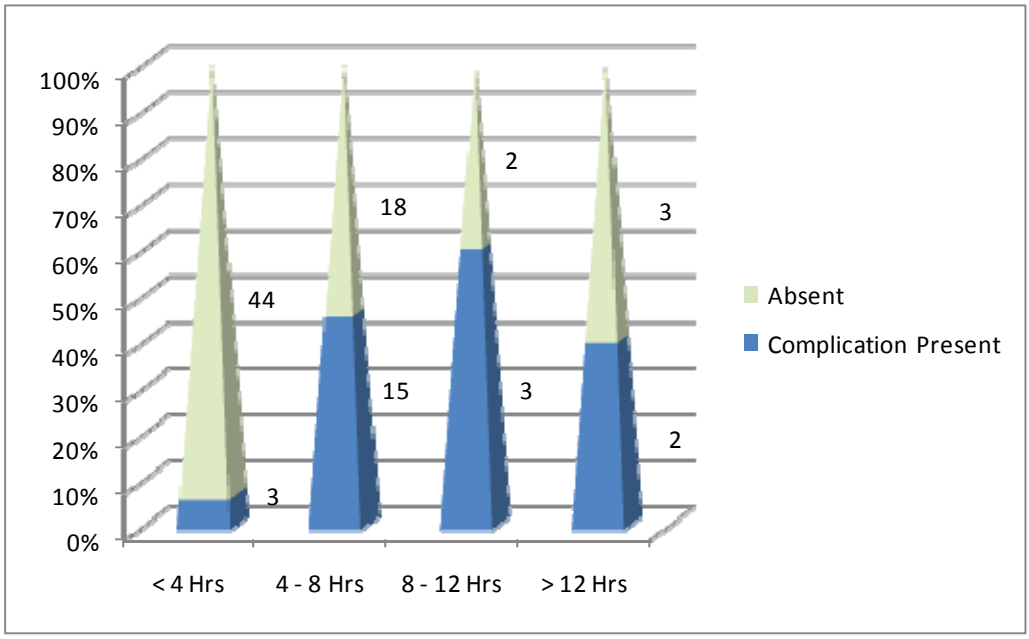
CELLULITIS AND COMPLICATIONS



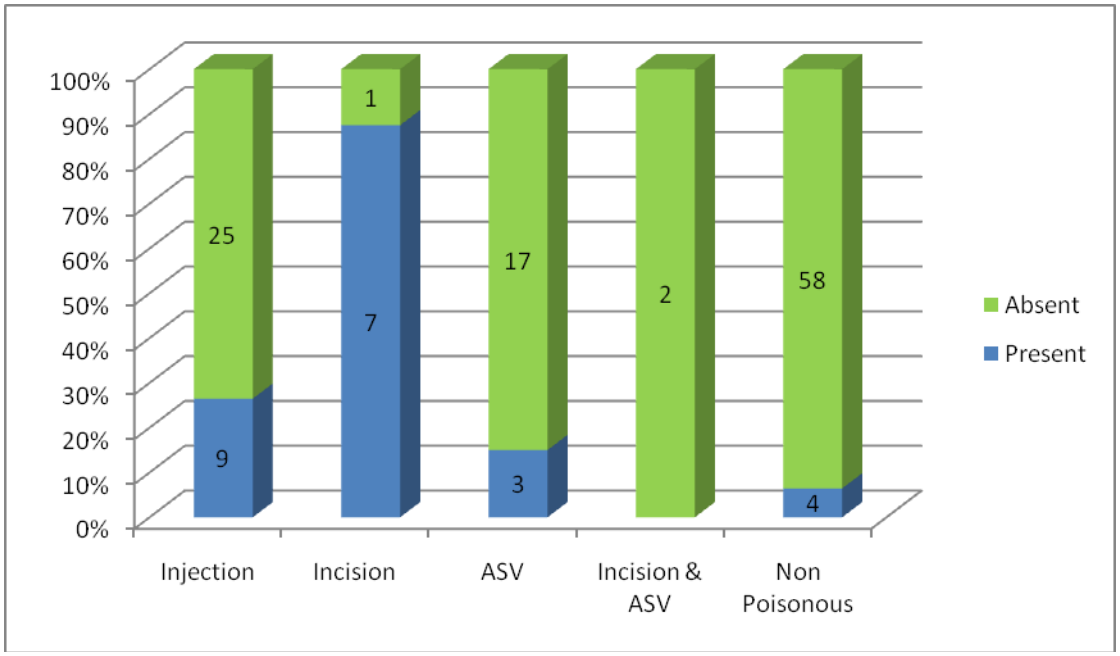
LIMB INVOLVEMENT AND COMPLICATIONS (IN CELLULITIS PATIENTS)



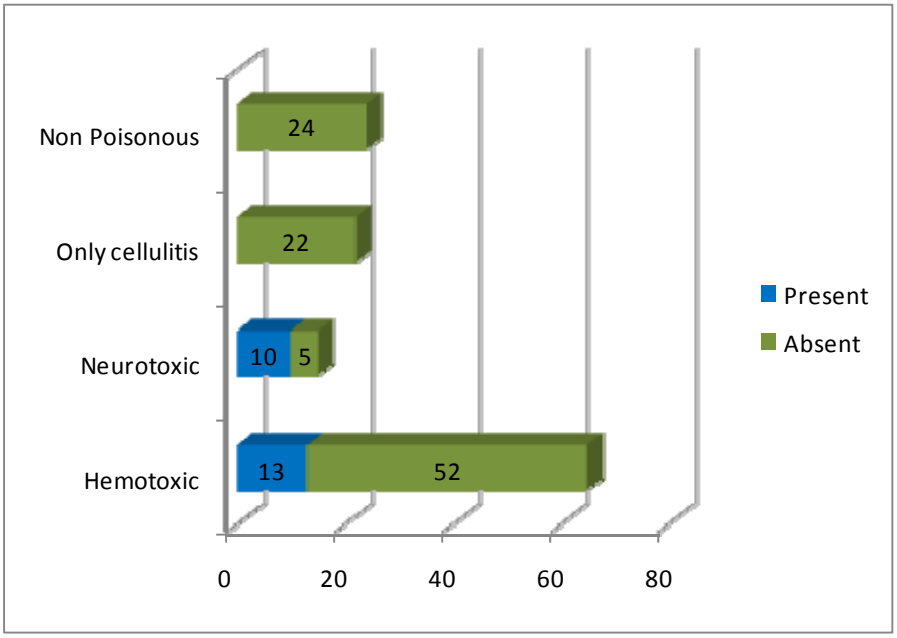
BITE TO NEEDLE TIME AND COMPLICATIONS (IN CELLULITIS PATIENTS)



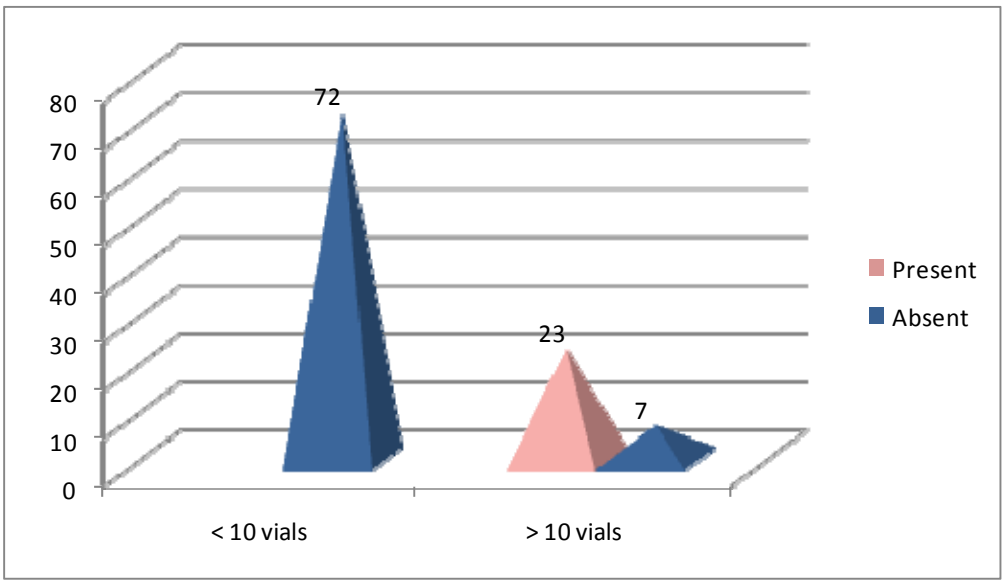
PRE HOSPITAL TREATMENT AND COMPLICATION



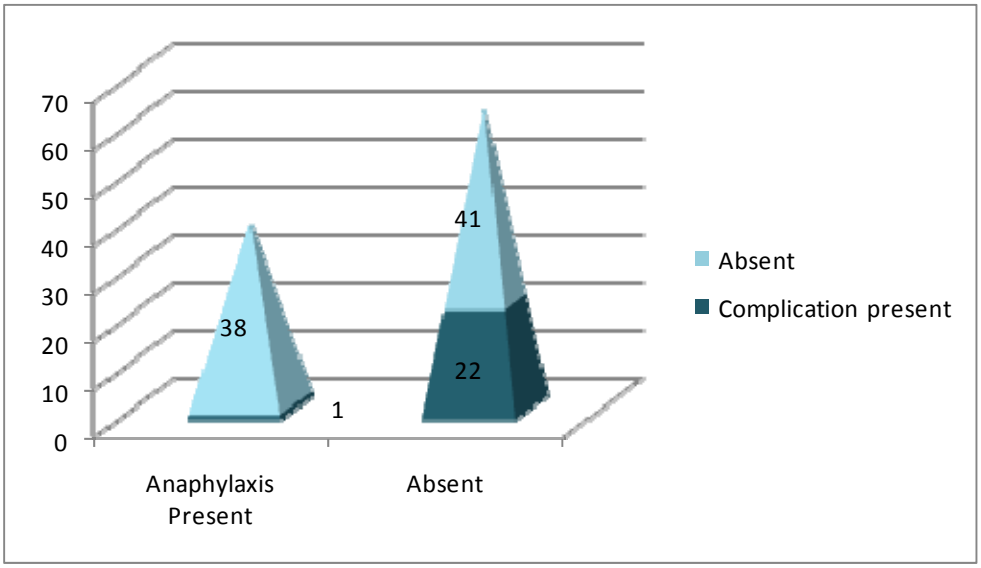
TYPE OF BITE & COMPLICATIONS



DOSAGE OF ASV AND COMPLICATONS



ANAPHYLAXIS TO ASV AND COMPLICATIONS



MASTER CHART

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
1	PRIYA	2Y	F	RURAL	5	L/L		+	+	Hemo		+	+		+		8	Alive
2	LAKSHMAN	6Y	M	RURAL	9	L/L	ASV	+	+	-		+	+				6	Alive
3	VELMURUGAN	10Y	M	URBAN	3	L/L		+	+	Hemo		+	+		+		7	Alive
4	ARUNKUMAR	9Y	M	RURAL	6	L/L		+	+	Neuro	Resp.failure	+		+		Ventilatory support	14	Alive
5	VALLIAMMAL	10Y	F	RURAL	3.5	L/L	INJ	-	+	Hemo		+	+		+		6	Alive
6	GOKUL	5Y	M	URBAN	2.5	L/L		+	-	NP		-	-	-			3	Alive
7	KALAIRAJAN	12Y	M	RURAL	6	L/L	INJ	-	+	-		+	+				5	Alive
8	SRIDHARAN	3Y	M	RURAL	5	U/L	I&D	+	+	Hemo	Renal failure	+		+		Dialysis	2	DEAD
9	MAHALAKSMI	9Y	F	URBAN	<1	L/L		-	-	Hemo		+	+		+		5	Alive
10	MURALI	8Y	M	RURAL	10	U/L	INJ	+	-	NP		-	-	-			3	Alive
11	SIVAPRIYA	11Y	F	RURAL	4.5	L/L		+	+	Hemo		+	+				6	Alive
12	ASIK ALI	7Y	M	RURAL	2.5	L/L		+	+	Hemo		+	+		+	Blood Transfusion	7	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
13	MURUGAMMAL	6Y	F	URBAN	4.5	L/L	INJ	-	+	Neuro		+		+	+		8	Alive
14	UMAPATHY	10Y	M	RURAL	3	L/L		-	+	Hemo		+	+				6	Alive
15	BEER MOHAMMED	7Y	M	RURAL	6	U/L	ASV	+	+	-		+	+		+		8	Alive
16	JERLIN ANITHA	12Y	F	URBAN	9	L/L	INJ	+	-	NP		-	-	-			3	Alive
17	MADHAVAN	11Y	M	RURAL	>12	L/L	ASV	+	+	-		+	+				5	Alive
18	AKILA BABY	4Y	F	RURAL	3	U/L	INJ	-	+	Hemo		+	+		+		6	Alive
19	RAGAVAN	8Y	M	RURAL	2	L/L		+	+	Hemo		+	+		+	Blood Transfusion	7	Alive
20	MUTHUSELVAN	9Y	M	URBAN	1	L/L		+	-	Hemo		+	+				5	Alive
21	MANIGANDAN	10Y	M	RURAL	7	L/L	I&D	+	+	Neuro	Resp.failure	+		+		Ventilatory support	10	Alive
22	NARAYANAN	6Y	M	RURAL	4	U/L	INJ	-	+	_		+	+				5	Alive
23	SUDALI	9Y	F	RURAL	10	L/L	INJ	+	-	NP		-	-	-			3	Alive
24	SIVAKUMAR	12Y	M	URBAN	1	L/L		+	-	Hemo		+	+				4	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
25	VALLIAMMAL	9Y	F	URBAN	1.5	U/L		+	+	Hemo		+	+		+		5	Alive
26	KRISHNA MOORTHY	12Y	M	RURAL	5	L/L	INJ	+	-	NP		-	-	-			3	Alive
27	IMARAN	5Y	M	RURAL	3	U/L		+	+	Hemo		+	+		+	Blood Transfusion	8	Alive
28	MASANA MUTHU	10Y	M	URBAN	2	L/L		-	+	Hemo		+	+				5	Alive
29	KAVITHA	10Y	F	RURAL	9	L/L	I&D ASV	+	+	-		+		+	+	Fasiotomy	10	Alive
30	JEYASARAN	8Y	M	RURAL	4	L/L	INJ	+	-	NP		-	-	-			3	Alive
31	LAKSHMANAN	11Y	M	URBAN	6	L/L	INJ	+	+	Neuro	Encephalopathy	+		+			14	Alive
32	PAVITHRA	7Y	F	RURAL	3	U/L		+	+	Hemo		+	+				5	Alive
33	MUTHURAJ	3Y	M	RURAL	4.5	L/L	ASV	+	+	-		+	+		+		7	Alive
34	AKSHAYA KUMAR	9Y	M	RURAL	>12	L/L	I&D	+	+	Neuro	Resp.failure	+		+		Ventilatory support	12	Alive
35	ARCHANA	8Y	F	URBAN	<1	Abd		-	+	Hemo		+	+		+		6	Alive
36	KRISHNA	10Y	M	RURAL	6	L/L	INJ	+	-	NP		-	-	-			3	Alive

SNO	PATIET NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
37	KALAI SELVAN	12Y	M	RURAL	6	L/L	ASV	+	+	-		+	+		+		5	Alive
38	ASHOK KUMAR	10Y	M	URBAN	2	L/L		+	-	NP		-	-	-			3	Alive
39	LATHA	8Y	F	RURAL	3	L/L		+	+	Hemo		+	+		+		6	Alive
40	HARIHARA SUTHAN	10Y	M	RURAL	9	U/L	I&D	+	+	Neuro	Resp.failure	+		+		Ventilatory support	12	Alive
41	ANUPRIYA	11Y	F	RURAL	4	L/L		+	+	Hemo	DIC	+		+		Blood Transfusion	14	Alive
42	BALASUBRAMANIAN	5Y	M	RURAL	4.5	L/L	INJ	+	-	NP		-	-	-			3	Alive
43	MU\RALI	9Y	M	URBAN	6	L/L	ASV	+	+	Hemo	Renal failure	+		+			8	Alive
44	KARTHIGA	6Y	F	RURAL	10	L/L	INJ	+	+	Neuro	Resp.failure Encephalopathy	+		+		Ventilatory support	5	DEAD
45	YASHEIK	4Y	M	RURAL	3	L/L		-	+	-		+	+		+		6	Alive
46	SUMATHI	9Y	F	URBAN	1	U/L		+	-	Hemo		+	+		+		5	Alive
47	SHANMUGAM	12Y	M	RURAL	>12	L/L	INJ	+	-	NP		-	-	-			3	Alive
48	SELVARANI	6Y	F	URBAN	1	L/L		-	+	Hemo		+	+				5	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
49	GOWSALYA	9y	F	URBAN	1	U/L	ASV	-	+	Hemo		+	+				5	Alive
50	SELVAKUMAR	11y	M	RURAL	5	L/L	INJ	+	-	NP		-	-	-			3	Alive
51	PETCHIMUTHU	10y	M	URBAN	1	L/L		-	+	Hemo		+	+				6	Alive
52	ARUN KUMAR	6Y	M	RURAL	2	L/L		+	+	Hemo		+	+		+	Blood Transfusion	6	Alive
53	DHANA LAKSMI	10y	F	RURAL	6	U/L	ASV	+	+	-		+	+		+		10	Alive
54	PRAVEEN	8Y	M	URBAN	2	L/L		+	+	Hemo		+	+				5	Alive
55	SELVAM	9y	M	RURAL	10	L/L		+	-	NP		-	-	-			3	Alive
56	MARIAMMAL	2Y	F	RURAL	3	U/L	INJ	-	+	-		+	+				6	Alive
57	RAJA KUMAR	12y	M	RURAL	>12	L/L		+	-	NP		-	-	-			3	Alive
58	NAVEEN	6Y	M	URBAN	2	Abd	INJ	-	+	Neuro		+		+	+		8	Alive
59	MUTHULAKSHMI	9y	F	URBAN	5	L/L		+	-	NP		-	-	-			3	Alive
60	AJAY	5Y	M	RURAL	2	U/L		+	+	Hemo		+	+		+	Blood Transfusion	5	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION {IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
61	HARI KUMAR	8Y	M	RURAL	5	L/L		+	+	Hemo	Gangrene	+		+		Fasiotomy	21	Alive
62	MALAIYARASI	11Y	F	RURAL	7	L/L	ASV	+	+	-		+	+		+		7	Alive
63	ESAKKIAMMAL	10Y	F	RURAL	9	L/L	INJ	+	-	NP		-	-	-			3	Alive
64	POOMANI	6Y	M	URBAN	3	U/L		+	+	Hemo		+	+				6	Alive
65	GAYATHRI	11Y	F	RURAL	>12	L/L	INJ	+	+	Neuro	Resp.failure	+		+		Ventilatory support	14	Alive
66	KARTHIKUMAR	3Y	M	RURAL	5	L/L	I&D	+	+	Hemo	Renal failure	+		+			10	Alive
67	SATHISH	10Y	M	URBAN	2	U/L		-	+	Hemo		+	+		+		7	Alive
68	MUTHUMARI	5Y	F	RURAL	6	L/L	INJ	+	+	Hemo	DIC Encephalopathy	+		+		Blood Transfusion	2	DEAD
69	MARIKUMAR	9Y	M	RURAL	3	L/L		+	+	Hemo		+	+				5	Alive
70	MAHALAKSHMI	6Y	F	URBAN	1	L/L		+	-	NP		+	+				3	Alive
71	ATHISIVAM	9Y	M	RURAL	2	U/L		-	+	Hemo		-	-	-			5	Alive
72	ASHOKKUMAR	8Y	M	RURAL	5	L/L	ASV	-	+	-		+	+				6	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
73	JAYAMURUGAN	2Y	M	URBAN	1	U/L		+	-	Hemo		+	+				6	Alive
74	RAJA	9Y	M	RURAL	>12	L/L	I&D ASV	+	+	-		+		+	+	Fasiotomy	8	Alive
75	KANNAN	10Y	M	RURAL	5	L/L	ASV	+	+	Hemo	Renal failure	+		+		Blood Transfusion	12	Alive
76	KARTHIKEYAN	10Y	M	RURAL	10	L/L	INJ	+	+	Neuro	Resp.failure Encephalopathy	+		+		Ventilatory support	14	Alive
77	NIVETHA	8Y	F	RURAL	4	L/L		+	-	NP		-	-	-			3	Alive
78	NAVINKRISHNA	9Y	M	URBAN	1	U/L		+	-	Hemo		+	+				5	Alive
79	UMASHANKARAN	12Y	M	RURAL	6	L/L	ASV	+	+	-		+	+		+		7	Alive
80	MARISELVI	8Y	F	URBAN	2	L/L		-	+	Hemo		+	+				6	Alive
81	JEYARAMAN	10Y	M	RURAL	3	U/L	INJ	+	+	Hemo		+	+				6	Alive
82	PRABHAHAR	9Y	M	URBAN	1	L/L		+	-	NP		-	-	-			3	Alive
83	PARITHI	3Y	M	RURAL	4	L/L	INJ	-	+	Hemo	Gangrene	+		+	+	Fasiotomy	21	Alive
84	VICTORIA	7Y	F	RURAL	5	L/L	I&D	+	+	Hemo	Renal failure	+		+		Dialysis	10	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
85	GOBINATHAN	10Y	M	RURAL	3	L/L		-	+	Hemo		+	+				5	Alive
85	ESSAKIAPPAN	8Y	M	RURAL	4	L/L		+	+	Hemo	Gangrene	+		+		Fasiotomy	21	Alive
87	TAMILARASU	11Y	M	RURAL	5	L/L	ASV	+	+	-		+	+		+		6	Alive
88	RAMESHKUMAR	6Y	M	URBAN	1	U/L		+	-	Hemo		+	+				5	Alive
89	LAKSHMI	9Y	F	RURAL	>12	L/L	I&D	+	+	-		+		+	+		8	Alive
90	RAJAN	9Y	M	URBAN	6	L/L	ASV	+	+	Hemo		+	+				5	Alive
91	KUMARAN	10Y	M	RURAL	7	L/L	INJ	+	+	Neuro	Resp.failure	+		+		Ventilatory support	14	Alive
92	NITHYA	5Y	F	URBAN	2	U/L		-	+	Hemo		+	+				6	Alive
93	MARIKUMAR	9Y	M	RURAL	6.5	L/L	INJ	+	+	Hemo	Renal failure	+		+		Blood Transfusion	12	Alive
94	ESSAKIPANDI	11Y	M	RURAL	10	L/L	INJ	+	-	NP		-	-	-			3	Alive
95	MAHALAKSHMI	6Y	F	URBAN	2	L/L		+	-	NP		-	-	-			3	Alive
96	PRAKASH	3Y	M	RURAL	3	U/L		-	+	Hemo		+	+		+		5	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
97	CHRISTY	8Y	F	URBAN	1	L/L		-	+	-		+	+				6	Alive
98	ABINAYAN	11Y	M	RURAL	6	L/L	INJ	+	-	NP		-	-	-			3	Alive
99	RAGAVAN	2Y	M	URBAN	4	L/L		+	+	Hemo		+	+				5	Alive
100	SHANKARAN	9Y	M	RURAL	5	U/L	ASV	+	+	-		+		+	+		10	Alive
101	VILLAIAMMAL	7Y	F	RURAL	3	L/L		-	+	Hemo		+	+		+	Blood Transfusion	8	Alive
102	PANNEERSELVAN	10Y	M	URBAN	2	U/L		-	-	Neuro		+	+				7	Alive
103	MARI	9Y	M	RURAL	5	L/L	INJ	+	+	Hemo	Renal failure	+		+		Fasiotomy	12	Alive
104	NANTHINI	6Y	F	URBAN	2	L/L		-	+	Hemo		+	+				5	Alive
105	SURESH	10Y	M	RURAL	>12	L/L	INJ	+	-	NP		-	-	-			3	Alive
106	ILAVARASAN	10Y	M	RURAL	1	U/L		+	-	Hemo		+	+				6	Alive
107	MUTHUKANNAN	4Y	M	RURAL	2	L/L		-	+	Hemo		+	+				5	Alive
108	ESVARAMOORTHY	8Y	M	URBAN	5	L/L	ASV	-	+	-		+	+		+		9	Alive

S NO	PATIENT NAME	AGE(years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
109	MARIAPPAN	9Y	M	RURAL	4	L/L	ASV	+	+	Hemo		+	+		+		6	Alive
110	BALAJI	4Y	M	URBAN	1	L/L		-	+	-		+	+		+		7	Alive
111	ELANGOVAN	7Y	M	RURAL	2	L/L		-	+	Hemo		+	+				5	Alive
112	RAJKUMAR	10Y	M	RURAL	9	L/L	INJ	+	-	NP		-	-	-			3	Alive
113	PRIYADHARSHINI	11Y	F	URBAN	5	L/L	I&D	+	+	Neuro	Resp.failure	+		+		Ventilatory support	14	Alive
114	MAHARAJAN	6Y	M	RURAL	2	U/L	INJ	+	+	Hemo		+	+				5	Alive
115	MUNDASAMY	9Y	M	RURAL	7	L/L	ASV	+	+	-		+	+		+		7	Alive
116	MURUGASAN	3Y	M	URBAN	1	L/L		+	-	Hemo		+	+				5	Alive
117	ESAKKIPANDIAN	8Y	M	RURAL	2	U/L		-	+	Hemo		+	+				6	Alive
118	SUDHARSAN	12Y	M	RURAL	5	L/L	ASV	+	+	Hemo	Renal failure	+		+		Blood Transfusion	12	Alive
119	SELVAMANI	7Y	M	URBAN	3	L/L	INJ	-	-	Neuro		+	+		+		7	Alive
120	ABILASIYA	10Y	F	RURAL	2	L/L		+	+	Hemo		+	+				5	Alive

S NO	PATIENT NAME	AGE (years)	SEX	AREA	TIME DURATION (IN HOURS)	SITE OF BITE	TREATMENT H/O	FANG MARK	CELLULITIS	TYPE OF BITE	COMPLICATIONS	REQUIRMENT OF ASV	<10 ASV	> 10 ASV	ANAPHYLAXIS TO ASV	OTHER RX MODALITIES	DURATION OF STAY IN HOSPITAL (days)	MORTALITY
121	ARULMURUGAN	4Y	M	RURAL	3	L/L		+	-	NP		-	-	-			3	Alive
122	MARISELVAN	10Y	M	RURAL	6	L/L	ASV	-	+	Hemo		+	+				6	Alive
123	MANIKANDAN	5Y	M	URBAN	3	L/L		+	-	Neuro		+	+				7	Alive
124	UMAPATHY	10Y	M	RURAL	5	U/L	INJ	+	+	Hemo		+		+	+		8	Alive
125	UDHAYAPRAKSH	8Y	M	RURAL	2	L/L		-	+	Hemo		+	+				5	Alive
126	ABUDHAKIR	12Y	M	RURAL	3	L/L		+	+	Hemo		+	+		+		6	Alive

L/L - Lower limb
U/L - Upper limb
Abd - Abdomen
Inj - Injection
NP - Non Poisonous
Hemo - Hemotoxic
Neuro - Neurotoxic
I & D - Incision at Bite Site

RUSSELL'S VIPER: (KANNADI VIRIYAN)

SAW SCALED VIPER: (SURUTAI PAMBU)

PIT VIPER

KRAIT (KATTU VIRIAN)

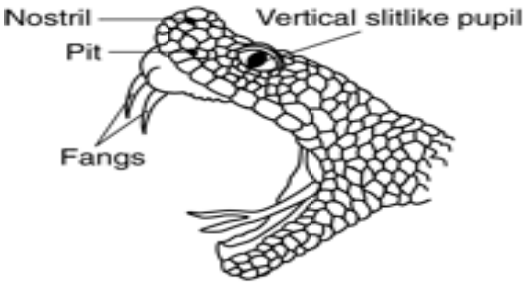
CAT SNAKE(OLAI PAMBU) NON POISONOUS

INDIAN PYTHON(MALAI PAMBU)

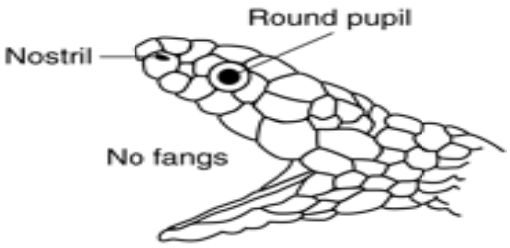
COBRA (NALLAPAMBU)

KING COBRA(RAJA NAGAM)

Pit Viper

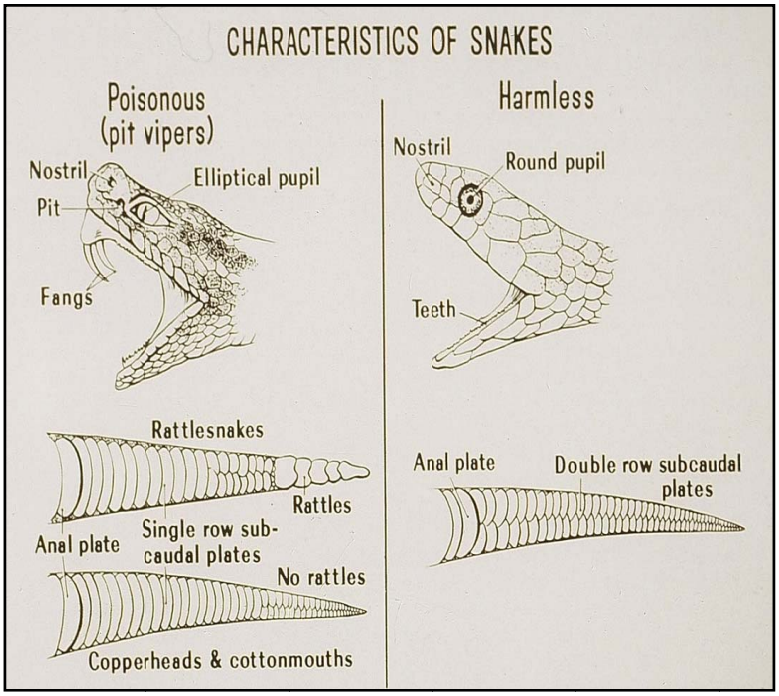


Nonvenomous Snake



Triangular head

Rounded head



VENOM GLAND WITH FANG:

VENOM EXTRACTION:

CELLULITIS WITH BLEB FORMATION